HISTORY

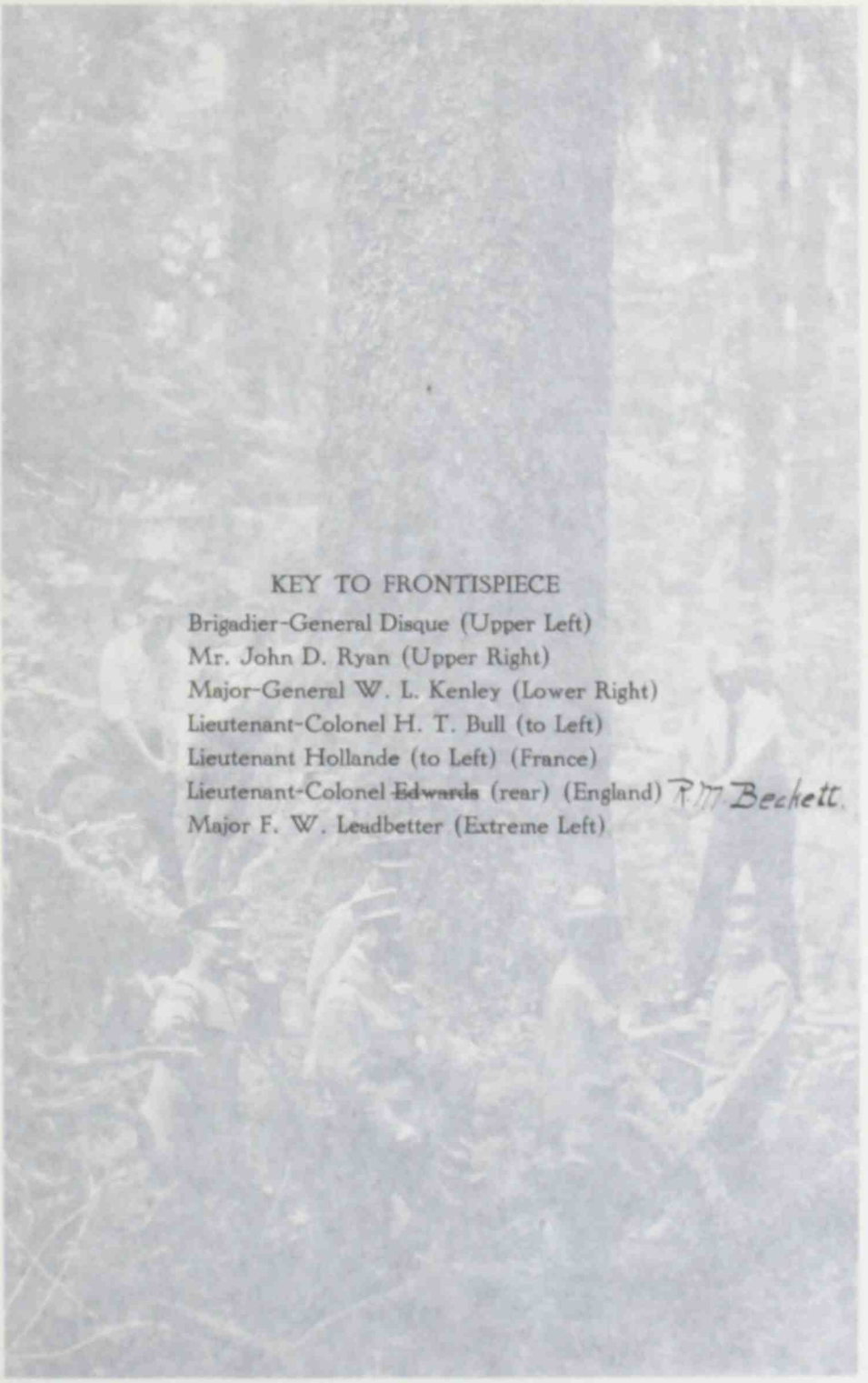
of

SPRUCE PRODUCTION DIVISION

UNITED STATES ARMY

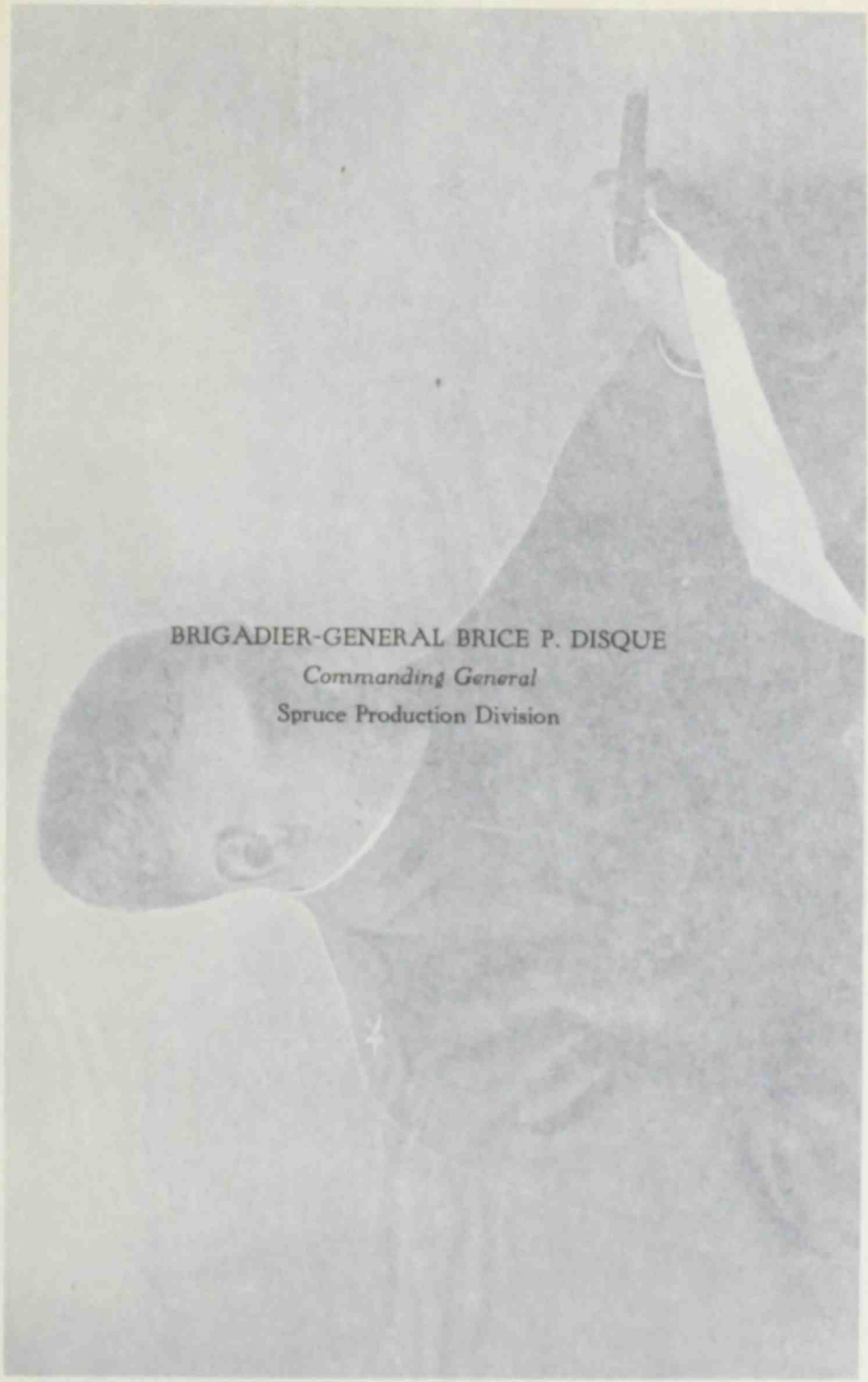
—AND—

UNITED STATES
SPRUCE PRODUCTION
CORPORATION



KEY TO FRONTISPIECE

Brigadier-General Disque (Upper Left)
Mr. John D. Ryan (Upper Right)
Major-General W. L. Kenley (Lower Right)
Lieutenant-Colonel H. T. Bull (to Left)
Lieutenant Hollande (to Left) (France)
Lieutenant-Colonel ~~Edwards~~ (rear) (England) R. M. Beckett.
Major F. W. Leadbetter (Extreme Left)



BRIGADIER-GENERAL BRICE P. DISQUE

Commanding General

Spruce Production Division

FOREWORD

Some confusion may be felt, in the perusal of the pages which ensue, owing to the apparent shifting and interchange of titles of Boards, and similar matters; the Spruce Production Division now appearing as a branch of the Signal Corps, and later as a part of the Bureau of Aircraft Production. To obviate misunderstanding the following explanatory paragraphs are appended.

At the outbreak of the War, the Air Service was organized as the Aviation Section of the Signal Corps, this organization dating from July 18, 1914. In May, 1917, the Aircraft Production Board was appointed by the Council of National Defense, to assist in outlining America's air program. Under this authority the first surveys of the Northwest were made. In October, 1917, the Aircraft Board was created by act of Congress to act in advisory capacity to the Signal Corps and the Navy.

In April, 1918, the Aviation Section of the Signal Corps was divided in two distinct departments. A Division of Military Aeronautics was created and placed under the direction of Major-General W. L. Kenly. Mr. John D. Ryan became Director of Aircraft Production, in charge of the Division of Production. The Aircraft Board remained as an advisory body, with Mr. Ryan as chairman. Further reorganization was effected on May 21, 1918, by Presidential order, under powers granted in the Overman Bill. By this order the Bureau of Aircraft Production was established, Mr. Ryan continuing as Director of Aircraft Production, and General Kenly becoming Director of Military Aeronautics. The Air Service was wholly divorced from the Signal Corps and erected into the separate bureaus named.

This arrangement continued until August when Mr. Ryan was made Second Assistant Secretary of War, and Director of Air Service, combining under one head the administration of aircraft personnel and equipment. The organization under which the Spruce Production Division worked was then the Air Service, Aircraft Production (A. S. A. P.).

INTRODUCTION

By Brigadier-General Brice P. Disque

In October, 1917, I was in Washington under orders to sail for France. Nothing less than a great national emergency could have persuaded me to undertake a duty in time of war six thousand miles from the battle-front. Having been an officer of the Regular Army most of my life, it seemed impossible that I should serve anywhere except in France. However, members of the Council of National Defense, my superiors in the Air Service, and the Secretary of War impressed me forcibly with the fact that they considered the production of spruce for aircraft to be one of the greatest unsolved problems of the war. It was represented to me that our successful termination of the war was largely dependent upon an immediate and very great increase in production of lumber suitable for aircraft purposes.

My mission was to increase the monthly production from three million to ten million feet at once. To a soldier, in time of war, any means that are necessary are justifiable. I determined to ship the ten million feet at the earliest possible date, regardless of cost, or of whom it hurt, because by so doing I might assist in stopping the war one day earlier. No one will ever know, but I firmly believe that not thirty per cent. of the three million feet of spruce lumber shipped in October, 1917, was useful or used in making airplanes. It is a very generous allowance to estimate that there was not more than 1,500,000 feet of suitable lumber shipped that month.

Upon arrival in Portland in October, 1917, my first act was to ask a conference with leading loggers and mill men of the Pacific Northwest. At that conference I learned that the entire lumber industry of the Northwest was in a chaotic condition. The I. W. W. seemed to be running away with things; there had been strikes and sabotage rampant for six months. Summer development of logging operations had been prevented and the industry was

going into the winter totally unprepared for normal business, to say nothing of the supreme effort it had to make because of the war.

I found that spruce was a by-product of the fir logging operations. It had never been a desirable commercial lumber and was only logged by fir operators because in their operations they came to a tree now and then. The great, virgin and relatively dense, stands of spruce had been avoided because of the low value and light demand for the lumber. Experienced loggers of prominence were certain that I was embarking upon an impossible undertaking. The average rainfall of eight feet per annum in the spruce area, most of it falling between December and April, rendered it impossible to drive railways through mountainous country until the summer of 1918.

The average spruce log is four feet in diameter, and must be twenty-two feet long to be useful for aircraft lumber. This log will weigh six and one-half tons, and, with a requirement of ten million feet of aircraft lumber a month at that time, it meant the movement of 70,000,000 feet of logs, or 192,000 tons, for an average distance of twenty miles through mountains not even provided with ordinary wagon roads in most places.

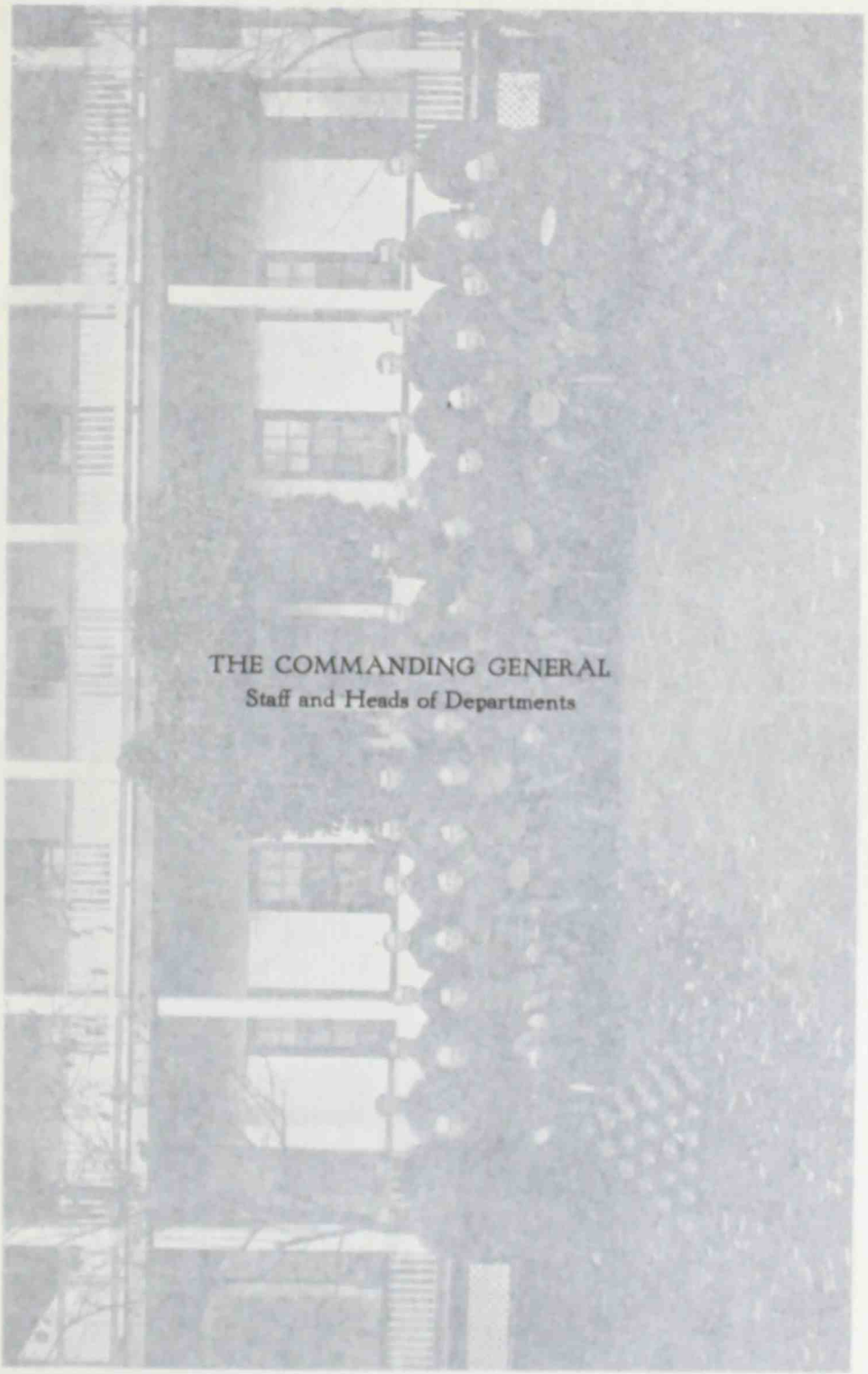
Loyal and skilled woodsmen had left the woods in large numbers through the draft, voluntary enlistment, distaste for strikes and agitation, or to secure the more attractive wages and conditions in other war industries. It was estimated that there was a shortage of seven thousand in October, 1917.

I immediately secured authority to organize the Spruce Production Division, and canvassed the Cantonments of the Army for volunteers of logging and sawmill experience, and began to organize the Division, which eventually was increased approximately to 30,000 officers and men, distributed in 234 camps over the west coasts of Washington and Oregon, from the Straits of San Juan de Fuca to the northern boundary of California, a total area of 25,000 square miles.

The officers and men of the Division were used to supplement civilian labor in camps and mills essential to the Government's war program. This was probably the first time that soldiers of the United States Army were ever used to labor in private industry. It was a radical departure from a custom as old as the nation, but rendered absolutely essential, and was promptly approved by the Secretary of War as a necessary war measure.

The soldiers, after spending a quarantine period in Vancouver Barracks, where they were taught the rudiments of drill, some discipline, sanitation and patriotism, were distributed throughout the industry, and there was an immediate increase in production and the elimination of sedition, sabotage and unrest of labor in camps and mills.

Worthy of note here is the fact that soldiers were employed by private operators in practically all instances; most of such operators having contracts, however, to supply the Government. The soldier labor was paid for by such contractors at the same wages as civilians similarly employed, and, therefore, they were practically no expense to the Government.



THE COMMANDING GENERAL

Staff and Heads of Departments

The payment of civilian wages to the enlisted men of the Spruce Production Division was made necessary because:

First—They were working for private operators who were making a profit on their product, and had the men worked for soldier pay, it would have resulted in unfair discrimination as against operators who were not supplied with soldier labor.

Second—To have allowed soldiers to work for soldier pay would have resulted in a cry of unfair competition with civilian labor, and would have brought many unfortunate complications.

Third—No enlisted man could have lived in the woods on his soldier pay. His board bill alone amounted to more than the Government paid him. Then he had to purchase expensive and special clothing, shoes, and similar articles, to perform his work.

Fourth—We were using these men to do the same service for the Government that was being performed by men in the shipyards and munitions factories, except that our soldier loggers submitted themselves to military discipline and organization, and thereby became more efficient. It would have been unfair to those men to have penalized them because they were soldiers by allowing less pay than they could have earned as civilians doing similar work.

As a soldier, I regretted the necessity of paying such wages. I do not believe that there should be any benefits accruing to one man serving in war time that do not accrue to all. Brave men submitted themselves to the supreme test in the battle line, leaving dependents at home. In my opinion all citizens of the nation should go on the same status in time of war; but it was not possible, and we did the next best thing, and what we believed to be the practical and proper thing.

Our next step was to bring home to the civilian laborers and the operators their vital connection with the Government's war effort. The Loyal Legion of Loggers and Lumbermen resulted, and grew to a strength of over 125,000 men, pledged to stand behind the nation. From the day the Loyal Legion was organized there has not been a single labor disturbance in the logging and lumber industry of the Pacific Northwest.

The labor problem out of the way, I next looked for the location of stands of spruce that were of such density and quality as to justify development. Preliminary cruises were made, and then plans were completed to drive thirteen railway lines into them. It was apparent in December that no railway operations could be prosecuted successfully until the spring of 1918, but this did not mean much unavoidable delay because of the necessity of surveying the routes, getting equipment together, and other preliminary work.

However, we could not wait, and immediate steps were necessary to increase production. Several conferences were held with representative lumbermen to determine how this could best be accomplished. The result was a decision to initiate a program of riving (splitting) spruce logs. The process is expensive and wasteful as a commercial operation, but justifiable as a war

measure. It made possible a production of about ten million feet of spruce before it could have been secured in any other manner. By splitting the log we reduced the size of the timber to be hauled out to about one-sixth of the original log. Such pieces could be hauled out of the woods by horses to an existing county road or an improvised road built by our men, loaded on trucks, and hauled to the nearest railway station.

Approximtely 6,000 enlisted men were engaged in riving operations, and over a hundred civilian operators contributed. As soon as railway development had progressed to a point where the log supply could be augmented, the riving operations were gradually suspended and selective logging replaced them.

I have never doubted the wisdom of riving, and will always feel that our decision to do it made possible the air supremacy of the Allied armies in the summer of 1918. We paid $130.00 per M. for rived stock purchased from private operators, and produced it in our own operations for about $105.00 per M. The same material had been sold to American airplane factories and foreign agents for $250.00 per M in December, 1917.

Having started to increase the supply of raw material, our next step was to look into manufacturing methods. Airplane lumber must be perfect, straight-grained material of long lengths. A novice, on his first visit to the average sawmill in the Pacific Northwest, could have noted at once that those mills were not equipped to produce the super-selected material required. The commercial sawmill of western Washington and Oregon is built to produce quantity and not aircraft quality. To slow down the head saw carriage so as to handle a great log with care, and study its grain, means to leave about three hundred men in the remainder of the mill awaiting material on which to work. Furthermore, the second operation in the average mill is to pass the great cants or flitches through an edger which saws them into longitudinal strips regardless of grain. The next step is to pass the strips through a trimmer which cuts out the defects and shortens each piece. The trimmer is operated by a man at a distance of about twenty feet from the piece he is trimming, and he cannot see what he is doing to a degree that renders careful selection possible.

Most spruce trees have a twist in the outer part of the log, that being where the clear lumber is found; and most of the cants that might produce airplane lumber have a diagonal or cross grain; and unless handled and treated according to its own peculiar grain, the cant would never manufacture into airplane lumber. These facts and many others led to the decision to construct what is known as the Cut-up Plant at Vancouver Barracks, Washington. The equipment of that plant was decided upon after several conferences with expert mill operators. All machinery, practically, had to come from east of the Mississippi River, but the plant was completed on the forty-fifth working day. As the supply of material increased, the plant got to a daily production of 1,500,000 feet, of which 1,000,000 feet was perfect aircraft lumber. Some 4,000 soldiers were employed in this plant, working three

shifts of eight hours each, and it was not unusual to handle 225 carloads of raw and finished material in a day. Subsequent to the completion of the original plant, there was constructed a twenty-four unit dry-kiln, and a planing-mill to re-work the commercial side-cut so that it could be sold to advantage. The total cost of all development at the Vancouver Cut-up Plant, when the armistice was signed, was $825,000.00.

In the spring of 1918, and some time after we had passed the monthly production of 10,000,000 feet, the Director of Aircraft Production notified me that an increase in the Air Service program had been decided upon, and that instead of ten million he wanted thirty million feet of lumber monthly, and that the requirement might go up to fifty million feet. He also advised me that we should work to a twenty-five per cent. factor of safety.

We felt at that time that about ten per cent. of the log was being manufactured into airplane lumber, and on that basis the new requirement meant another increase in log production of 275,000,000 feet of spruce logs, and since the average stand of spruce was not over twenty per cent. of all timber, it meant to log a total of 1,375,000,000 feet of additional timber monthly, or an annual increase of about 16,500,000,000 feet. The total annual cut of all timber in the Northwest in normal times is about 6,000,000,000 feet. Therefore, after we had already brought about a seven hundred percent increase in production of aircraft lumber, we were called upon to increase it again; and that additional effort meant to nearly treble the combined effort of the entire logging industry.

The labor, machinery and time available, rendered such increase in logging impossible. Therefore, we had to find a substitute method, and resorted to selective logging. Instead of clearing the forests as we went, we preceded the logging operations by tree-spotters, who selected the perfect spruce trees, marked and numbered them, and plotted them on a map. The logging operators followed, and felled only the selected trees, thus saving a great amount of labor and machinery. All effort was concentrated upon the tree that produced what we wanted. We had learned that carefully selected spruce trees yielded about twenty-five per cent. of their total merchantable footage in perfect airplane lumber, and since the average tree yielded only about ten per cent. we were justified from another direction in undertaking selective logging.

Lumbermen as a rule disapproved of selective logging. It was asserted that it was an impossible operation, extravagant, wasteful and costly. Timber owners declared that it ruined their forests. But it had to be done as a war measure. Also, granting the possibility of logging 16,500,000,000 additional feet per year, it would have been a criminal waste of labor and machinery at a time when every effort was required by the Government; and furthermore, there would have resulted a surplus supply of over twelve billion feet of logs of all kinds, more than two years' cut. The effect of this on the legitimate industry would have been disastrous.

The officers of one of the principal loggers' bureaus insisted that selective logging could not be done for less than $50.00 per M, and, believing that the price was too high, we undertook to do the work ourselves through cost-plus contractors. The final costs proved that we were correct, in that the average cost to October 31, 1918, was $23.76 per M to our cost-plus contractors, without allowance for depreciation; and had our operations continued, we are confident this cost would have gone very close to $15.00.

The Spruce Production Division of the Army financed all operations with funds of the United States up to the summer of 1918, when Mr. John D. Ryan, Director of Aircraft Production, secured legislation authorizing the formation of a corporation along the lines of the Emergency Fleet Corporation. The United States Spruce Production Corporation resulted. The principal reasons for forming this corporation were:

First—About seventy per cent. of the production of aircraft lumber was allocated to Great Britain, France and Italy, and it seemed only equitable that they should bear that part of the expense necessary to build the mills and railroads required.

Second—We were actually carrying on a great industrial enterprise, and required the freedom of action usually found in a business concern and almost impossible under War Department regulations.

Five of the seven directors of the corporation were patriotic citizens of the highest standing in their respective communities, and men experienced and successful in business and lumber operations in the Northwest. The remaining two directors were Army officers on duty with the Division. The United States Government held and voted all of the stock of the Corporation except the one share necessarily owned by each director. But our Government paid for only a small portion of the stock. The Allied governments agreed to purchase debentures, taking amounts of a $25,000,000.00 issue which were proportionate to the aircraft lumber allocations made to them. We provided in this way for our Allies to assist in the capital expenditures before they were made, rather than doing it after development, through paying for lumber, the sales price of which included amortization of capital expenditures on a basis of complete amortization in ten months after completion.

Because of the importance of the lumber industry in the Pacific Northwest, there has been a great amount of discussion regarding the operations and costs of this organization. Most of it has come from people totally ignorant of our problems, methods, or other facts. It is appropriate, therefore, to refer to the quantity of production and the cost of it, in this summary. The accountants of this organization have had instructions from the beginning to include in their cost-accounting every legitimate item; and that means rent, stationery, telephone, officers' and soldiers' pay and subsistence, as well as transportation, and purchase of all stumpage, materials, equipment and rights of way, and hire of labor.

From the beginning of our operations, and including estimated expenditures to April 1, 1919, the total expenditures of the Spruce Production

Division and the United States Spruce Production Corporation for all purposes amounted to $45,543,703.26. The total amount of super-selected spruce and fir aircraft lumber shipped was 143,008,961 feet. Assuming that our estimated $24,000,000.00 worth of properties have no salvage value whatever, the cost of the lumber produced would be $318.48 per thousand feet.

The present assets of the Corporation, most of which have a salvage value and which are now concentrated so far as possible and catalogued, cost us approximately $24,000,000.00. We believe that we are conservative in estimating that we will sell them for 33 1/3 per cent of their cost, or $8,000,000.00. We may therefore deduct this amount from the total expenditure of $45,543,703.26 and find that the 143,008,961 feet of airplane lumber shipped actually cost $37,543,703.26, or $262.53 per M, which represents the total cost per thousand feet of the aero lumber shipped by the Division and the Corporation.

Of the total expenditure of $45,543,703.26, $15,000,000.00 was for railways and mills which were just about completed when we suspended operations, and while entirely justified and required for the anticipated 1919 production, did not produce a foot of lumber. Deducting this $15,000,000.00 from the total expenditure of $45,543,703.26 we find that, allowing no salvage value whatever for our property, the 143,008,961 feet would have cost $30,543,703.26, or $213.58 per thousand feet had we not anticipated the 1919 requirements of the United States and her Allies.

Included in this expenditure of $15,000,000.00 is an estimated salvage value (on the basis of 33 1/3 per cent) of $5,000,000.00, leaving an estimated salvage value on the equipment actually used in the production of the airplane lumber shipped of $3,000,000.00, which deducted from the $30,543,703.26, shown above, leaves $27,543,703.26, or $192.60 per thousand feet, which is in all fairness approximately the proper figure to assume as the cost of the airplane lumber shipped, taking into consideration only the expenditures actually made for its production.

As an Army officer sent to perform a war duty, I would not be concerned at any cost that was honestly incurred; but as a citizen I am gratified that we were able to effect a 1700 per cent. increase of so vital a product at such reasonable figures.

The Signal Corps of the Army was paying $105.00 per M for an inferior quality of spruce when our operations were started. I believe that that was a fair price to producer and Government, and had our country and the Allies been satisfied with 3,000,000 feet of that quality monthly, I believe that all of it could have been produced by the industry at that price throughout the war. But the demand was for a 2500 per cent. increase, and that meant construction of thirteen railways, four large mills, and millions of dollars worth of equipment, all of which had to be amortized during the period of the operation. Had this organization not come into existence when it did, there is no telling where competition of the American factories and Allied agents would have driven the price of spruce; and when it is realized that only a very small percentage of the material as furnished in the fall of 1917 was

useful as airplane stock, it is not difficult to imagine what would have been the fate of the entire Allied aircraft program. It would not have expanded, because the production of the vital lumber would not have increased; thousands of freight cars and tons of ship cargo space would have been wasted, carrying lumber that became waste, at a time when the number of soldiers on the Western Front depended almost entirely upon shipping facilities.

The records of our office will show that thousands of freight cars have been saved for more important work, and that the American factories, instead of using less than fifty per cent. of the lumber received by them, were able to place in actual aircraft construction between eighty-five and ninety-five per cent. of the material shipped from the Vancouver Cut-up Plant.

The general impression that spruce wood was the only lumber of any quantity produced by this office should be corrected. In the winter of 1917-1918, the experts of the Bureau of Aircraft Production learned that fir and Port Orford cedar were good substitutes, and their use was authorized, fir for training planes, and Port Orford cedar for the same use as spruce. Subsequently fir was authorized for all classes of airplanes, and when the demand for thirty million feet a month came, our call for fir was met in a magnificent manner by the fir lumber manufacturers of Washington and Oregon, who actually increased their production 100 per cent. in July, another 100 per cent. in August, and another 100 per cent. in October, 1918, so that by the time of the signing of the armistice, the total fir shipped from this office amounted to about seventy-five per cent. of the total spruce shipped.

In concluding this personal contribution to the history of the Spruce Production Division and the United States Spruce Production Corporation, I should like to commend by name every officer, soldier, and civilian employee who has participated and rendered possible what was accomplished. To all, the nation owes a debt of gratitude; all have sacrificed to serve, and all have given the best they had in a work that carried none of the glory and glamor of the battle-front, and yet called for a supreme effort. I have seen many brave men of mature years shed tears of regret when advised that they could not be transferred to a combatant division. I have also seen ten thousand soldiers of the Division go wild with joy in an outburst of enthusiasm when Mr. John D. Ryan, Director of Air Service, told them that there was a chance to go to France. But all turned to their immediate tasks, hopefully awaiting the day when they could lay aside the axe and the saw and take up the rifle to complete their job.

To Mr. John D. Ryan, Assistant Secretary of War, in charge of the Air Service, I wish to express sincere appreciation for his intelligent, sympathetic and broad conception of my problems, and for his generous aid in their solution.

To the lumbermen of the Pacific Northwest I would say that they have played the game as we like to think American business men should. And to the lumberjacks and sawmill workmen, I wish to say that they have set

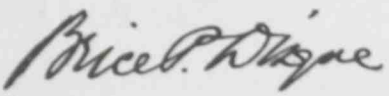
an example of loyalty, patriotism and efficiency that may well be emulated throughout the country.

To the officers and employees of the railroads which traverse Washington and Oregon, I would say that they have given their best, and always and cheerfully have met emergencies to the best of their ability.

To those able and unselfish gentlemen who have given so much of their time as advisors to this office, and as directors of the Corporation, I wish to record the Nation's thanks.

To all, I wish to express my own sincere thanks and gratitude.

To Lieutenant-Colonel Cuthbert P. Stearns, and to Captains Alexander McAndrew and Edward W. Freeman, my Chief of Staff and personal aides, I would say that more loyal, capable and patriotic men do not exist, and my personal appreciation of their services, cannot be expressed in words.



Brigadier General U. S. Army.

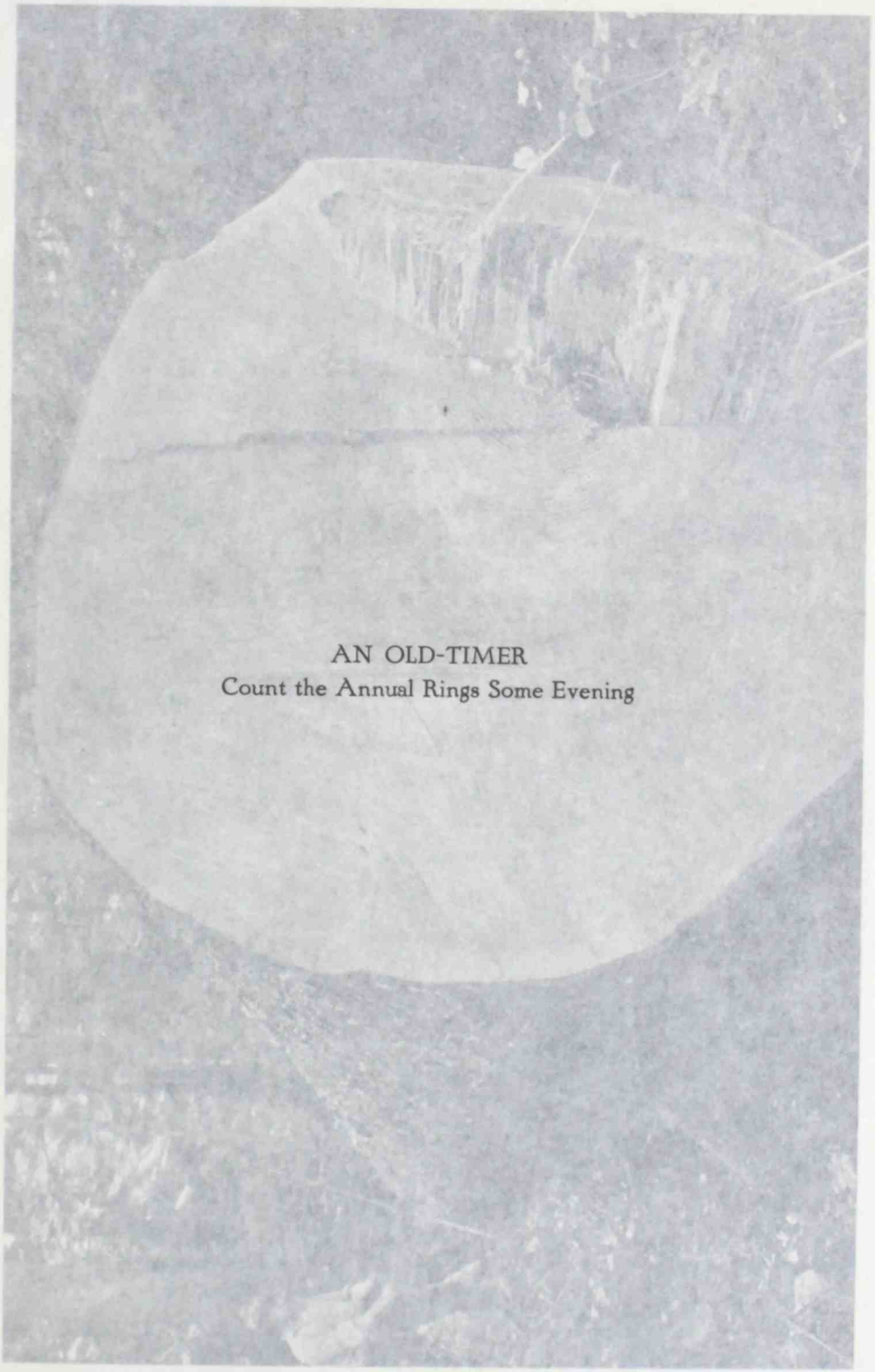
CHAPTER I

The Air Power Program

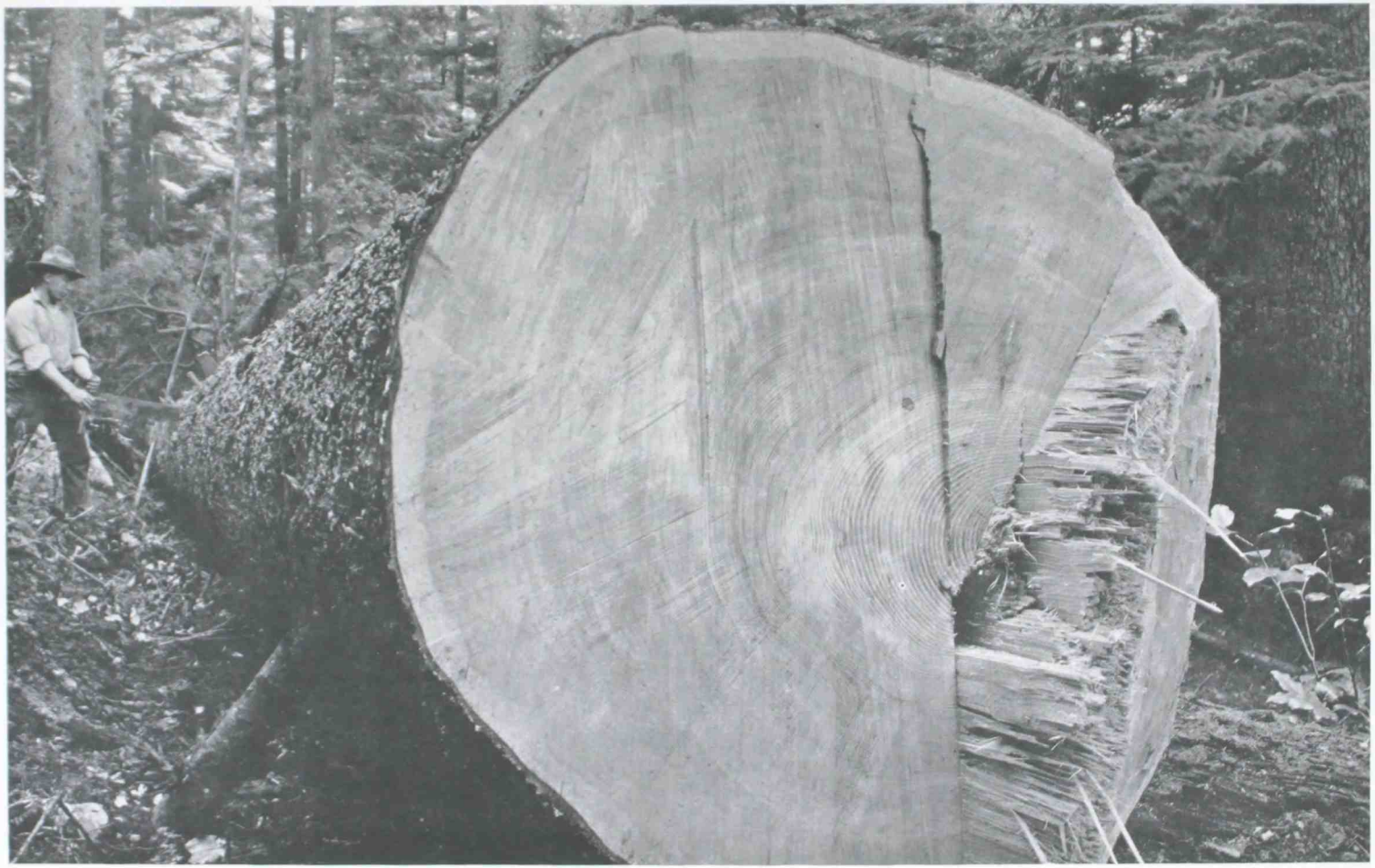
ROM THE DAYS of the early Pharaohs, wars have been fought essentially on a plane of two dimensions. Yet from the first, men seemed to seek in battle the supremacy of the upper air. Such attempts precede even historical record, and we find the story of the Tower of Babel in the folk-lore of ancient Israel. The walls of Babylon were builded high and wide to achieve superiority in the third dimension. Against them the Assyrians sent huge war-towers on wheels, that the height might be conquered. Air superiority seems instinctively to have been sought from the beginning, and to have been recognized as vital.

It is a striking fact that not until the whole world was embroiled in war did the mastery of the air come. The Great War of the twentieth century is the first really to be fought in three dimensions. Air supremacy, consequently, becomes the *sine qua non* of modern warfare. Without it, the artillery is five-sixths blind; without it, the infantry is butchered. The battle line swaying back and forth for four terrible years across northern France was largely governed in its sway according to the side on which air advantage lay. No signal victory could be achieved on either side until air supremacy had been achieved and held for a sufficient length of time to allow the army of the earth to strike, unmolested by a hostile force in the skies, and aided by its own birds of battle. For the air service is much more than the "eyes of the army." The army with air superiority has precisely the same advantage as the old long-spear phalanx of the Spartans had over the short and clumsy battle-axe; precisely the advantage the light-clad English archers possessed at Agincourt over the armored and caparisoned French—the advantage of longer reach and greater mobility.

To secure and retain this air superiority was America's particular contribution to the cause of civilization. She was to do more than this; but this she was to do, because she alone could do it; she alone had the resources. Consequently the ambitious American air program. It could not be too ambitious. There were many ramifications to that program. It was necessary to



AN OLD-TIMER
Count the Annual Rings Some Evening



secure and train fliers. It was necessary to develop a super-motor. Castor beans had to be planted and the oil made. Innumerable yards of linen had to be found, and when linen failed, a substitute of cotton had to be devised. Factories already in existence must be speeded up, must be enlarged, and new ones must be erected. And there must be wood. Wood that should be both tough and light. Wood that should not splinter from the impact of a bullet. Wood that should be stout and strong but not brittle. Wood that should be straight-grained and free from flaw. A perfect wood in brief. And there must be thousands upon thousands of feet of it. No one realized, no one even dreamed, that before this single item could be procured, an army must be sent to make war in the virgin forests, a vast industrial machine must be built up, and a great story of pluck and grit, of daring initiative and patient resourcefulness must be carved out. That is the story of producing spruce in the Northwest.

The Home of Sitka Spruce

Sitka spruce, (*Picea sitchensis*) also called tideland spruce and western spruce, is the wood which is found to have the necessary qualities of toughness and lightness which make it the airplane wood *par excellence*. It is the largest of the whole family of spruce trees, attaining a height of two hundred feet with a fifteen-foot diameter. Its habitat ranges from Mendocino county, California, northward along the Pacific coast to Kodiak Island, Alaska. But at the limits of these boundaries, the tree degenerates so as to be worthless for aero lumber. It has thus, a north and south range of 2000 miles, but east and west the strip is a mere fifty-mile ribbon along the coast. It grows abundantly on the western slope of the Coast Range in the states of Oregon and Washington, and thrives on the fogs and rains from the ocean. It has been estimated that 18,000,000,000 feet of this timber stands in the Northwest, about 11,000,000,000 feet being in the two states just named. But of this, only about 4,000,000,000 is reasonably accessible. The fir found in this region is also used for airplane stock, and the Spruce Production Division supplied large quantities of fir for airplane manufacture. Idaho white pine, too, has been considered as suitable for small parts in airplanes, and some small amounts of this wood were shipped even for wing-beams.

Sitka spruce was a familiar wood in the west, even before it was demanded by the birdmen. No other western tree probably, was put to such varied uses. Sounding boards for pianos, tops for various stringed instruments, and pipes for organs were made of it; thus it made its contribution to art. It went into playground apparatus, into the parts of pleasure boats, and contributed thus to the nation's recreation. It visited the household as an ironing board or a refrigerator. It went to the farm to make wind-mill wheel-slats, and poultry-brooders. It went into boxes and trunks and veneers, into sash for doors and windows, and the paper pulp mills took a large quantity. Finally, it was used in the construction of caskets. Prophetic use!

For the spruce that took wings over Europe's armed hosts proved to be the coffin for Hohenzollern hopes.

Not only is the Sitka spruce a tree of mighty dignity, but also a tree venerable with years, a rival to Methuselah. The coming of war found the human factor in America unprepared, but Nature long had been preparing America's part in the great struggle. When Columbus set forth on his epoch-making adventure, these giants of the Oregon hills already had reached a vigorous manhood. The Great Charter of Anglo-Saxon liberties was torn from the wretched hands of the pusillanimous John in 1215. But long since, liberty had begun to grow in the spruce forests of a land undreamed of. Some of them at least were contemporaries of William the Conqueror; young and tender sprouts when Harold fell on the historic field of Hastings.

Such is spruce, the "ally of the Allies." To take this giant from the air where he has towered in magnificent immobility for so many generations, to fell him to the ground, to lay him low; and then to sing *Resurgam* over him, to impart lightness, speed, action, in place of his age-long stolidness, and to restore him to the skies whence he came—that was the task of the Spruce Production Division.

CHAPTER II

Getting the Spruce Program Under Way

HE United States of America cast itself into the turmoil of the world war on April 6, 1917. There was organized almost immediately, in Washington, D. C., the Council of National Defense. A subsidiary committee of this council of "dollar-a-year men" was the Aircraft Production Board, Howard E. Coffin being chairman. A sub-committee of this board, on lumber production, was brought into being with Charles R. Sligh, a furniture manufacturer of Grand Rapids, Michigan, as chairman.

It is with Mr. Sligh, afterward Major Sligh, that the story of the Spruce Production Division begins. In May of 1917, the month following the declaration of war, Mr. Sligh was sent to the Pacific Northwest to investigate the lumber situation. His report made on July 25, indicated some of the difficulties with which the production of aircraft spruce was hampered. "The situation is very serious," reads this report. "It calls for heroic measures . . . It is one of increasing production by . . . every contribution of knowledge or ability to accomplish the seeming impossible. The industry must be largely revolutionized, and this with skill, sureness and justice, else the attempt will fail."

The Sligh report made seven recommendations, and in them it is possible to see the seeds from which the Spruce Production Division finally grew. Real evolution is visible. Higher forms of organization were developed out of lower. A given step was taken. Scarcely had the move been consummated when it was found inadequate, and further organization along the same line clearly necessary. The Division grew until finally it included 27,661 enlisted men and 1,222 officers, together with 125,000 civilian loggers and lumbermen, welded into an efficient fighting machine.

Mr. Sligh's recommendations, in brief, were:

1. Direct dealing between the Government and the mills, and elimination of the middle man.

2. An expedition to be sent to the coast, representing the Government, and the aircraft manufacturers.

3. The organization of the spruce mills into an emergency bureau.

4. The contracting of the entire output for one year.

5. The Aircraft Board to be the contracting agency for the entire supply.

6. Establishment of a supervising authority in the Northwest, representing the Government.

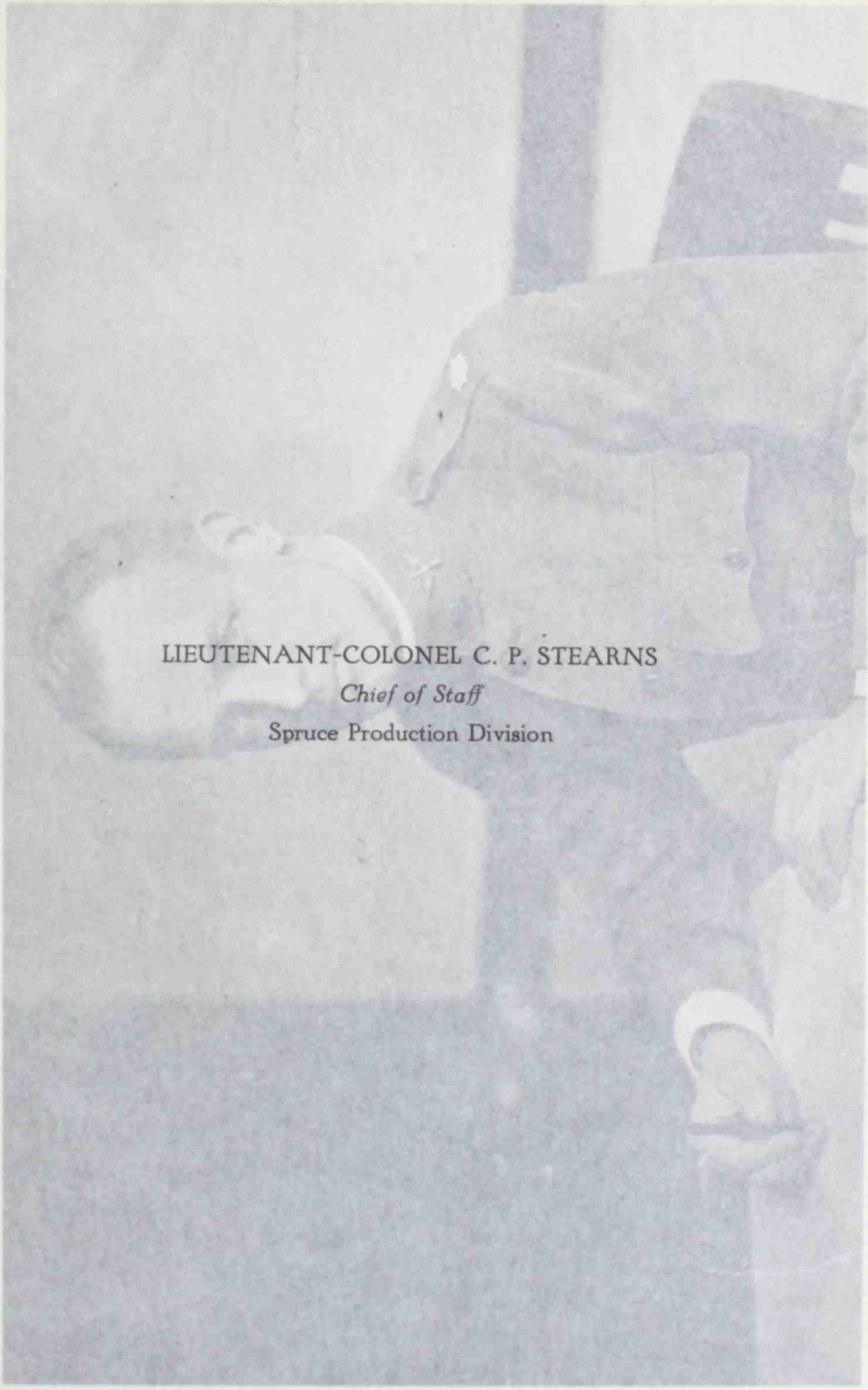
7. Inspection that should represent co-operation between mill and aircraft builder.

No doubt, at the time, these recommendations seemed more than drastic. Hindsight being proverbially better than foresight, it is readily seen now how futile even such measures would have been. Even Mr. Sligh did not sense the tremendousness of the problems involved. His report does not so much as mention the labor problem, though this proved to be probably the most perplexing difficulty that had to be met. Mr. Sligh saw the necessity of sending an expedition to the coast; he did not foresee the necessity of sending an army thither. He did not foresee the building of a dozen railroads; the development of a huge industrial organization to control the distribution of equipment; the erection of gigantic mills, Government owned, for the proper sawing of the log. It is not possible that he should have. In one brief year, the Spruce Production Division crowded into its existence the solution of business and production problems, in number and complexity equaling those which ordinarily fall to an industry in the course of a generation.

Establishing the Portland Office

For a considerable period in the summer and fall of 1917, the idea persisted in Washington that nothing was necessary in relation to the production of spruce, save the establishment of a rigid inspection on the coast, together with general oversight by a Government representative. Such a representative was sent in September from the Inspection Division of the Signal Corps, Aviation Section. A disbursing officer also was sent in the fall, this being Lieutenant (later Captain) James Van D. Crisp. About the same time came Lieutenant (later Major) George Powell, as traffic officer. Both of these did yeoman service in the early days of the Division history. An office was opened on the fifth floor of the Yeon building in Portland, Oregon, with Mr. (later Captain) E. J. Clark as district manager in charge of inspection. He was assisted by Mr. M. E. Crumpacker, later commissioned as First Lieutenant, and then Captain.

To this group soon came the consciousness of need of further assistance, and Mr. Russell Hawkins, head of the Whitney corporation, with large timber holdings in the Northwest, was sent in an advisory capacity. He was to tell them what to do and how to do it. Meantime, the authorities in the East were beginning to realize that the measures taken were far from adequate, and early in October Lieutenant-Colonel Brice P. Disque (he was



LIEUTENANT-COLONEL C. P. STEARNS

Chief of Staff

Spruce Production Division

advanced to a Colonelcy shortly thereafter, and promoted to the rank of Brigadier-General in October, 1918) was sent out to make a confirmatory survey, and, in general, to size up the situation.

The Coming of Colonel Disque

He arrived in Portland on October 11, 1917. The history of the Division proper really begins with this officer. From the beginning he found himself opposed by obstacle after obstacle, some of them arising out of the circumstances of the time; some of them thrown against him by those who disapproved of him and his methods, or upon whose tender toes he found it necessary to tread. Mutual jealousies and antagonisms among various groups in the industry created problems for him to solve. Petty politicians seized upon the situation in order to win publicity for themselves, and to pose as palladiums of the people's interests, or of the industrial interests of the region, making what use they might of the exigency in order to pour water on their own particular political wheels. And most of all, there was the job itself, presenting daily its manifold perplexities.

General Disque was first identified with the Army in 1899, when he enlisted and saw service in the Philippines. He was made first sergeant at once, and shortly received a commission as Second Lieutenant, in which capacity he aided in the pursuit of the elusive Aguinaldo. He stuck by the Army until 1917, at which time he was Captain in the 15th Cavalry, U. S. A. In January of that year he was offered by cable the office of warden of the Michigan State Penitentiary at Jackson, which he accepted. But when Uncle Sam tossed his hat into the battle ring, Warden Disque promptly offered his services to the nation, expecting his old cavalry commission back again. Instead he was made a Lieutenant-Colonel in the Signal Corps. He prepared to go to the Western Front; was indeed on the eve of departure. Then in a moment everything was changed, and he was ordered instead to the Northwest to look into spruce production conditions. And there he remained. Caesar earned fame for himself with his laconic message, "I came, I saw, I conquered." Of General Disque's experience in the West, it has been remarked, "He came to see and stayed to saw!" At the time of his coming there was a spruce production of about three million feet a month, of which only about ten per cent. was good for airplane manufacture. Meantime the United States Government and the Allies were beseeching high heaven and the Pacific coast for ten million feet a month, and a substantial increase in the percentage of actually usable material. General Disque succeeded in getting out 13,583,164 feet in April, 1918, whereupon the demand was raised to thirty million feet a month. In the closing days of August, the big Cut-up Plant at Vancouver actually struck this giant stride. In October the total cut of this plant was 28,681,239, of which 20, 282,933 was airplane stock.

"Get together" was the keynote of the Disque policy in the Northwest woods. He was able, fortunately, to bring together factions and cliques that

had been making both clandestine and open war on one another for years; to bring together the employer and employee; to bring together the millmen, timber-owners, and the loggers. Every item that had a bearing on the job he came west to do was applied to the doing of the job. The spirit of co-operation brought order out of chaos. By it a big organization was "put over" and the accomplishment of tangible results was made possible.

Organizing the Division

His survey completed, General Disque returned to the East, made his report and recommendations (which were approved) to the Aircraft Board and almost immediately returned to the Pacific coast with instructions to take over the whole spruce program. He was met in Portland by Major (later Lieutenant-Colonel) C. P. Stearns, who had been ordered from Hawaii, and detailed to assist the commanding officer in the work of spruce production.

Colonel Stearns continued to be the General's right hand man to the end of the chapter; first as Adjutant, and later, (when this post was surrendered on July 11, 1918, to Major J. D. Cope) as Chief of Staff. He was made Adjutant on November 13, 1917, though the Adjutant's office as such was not opened until a month later. The Division was formally created on November 15, 1917, and on November 20, 105 officers reported from the Second Officers' Training School at the Presidio of San Francisco. Ten of these officers were detailed for organization work for the Loyal Legion of Loggers and Lumbermen (of which an account, later) and the remainder sent to Vancouver Barracks, where Major (later Lieutenant-Colonel) McCammon was in charge.

The first office organized was that of the Loyal Legion. The second move was the establishment of the Cantonment at Vancouver Barracks, which from the outset was the Division depot. At first, only the Cantonment was under the Spruce Production Division. Later the entire Post was transferred to this command, with Lieutenant-Colonel (later Colonel) C. W. Van Way in charge. Five thousand enlisted men from the National Army reported at Vancouver on December 4, 1917.

The third office to organize was that of the Medical Department with Major Blackmoore as senior medical officer. Later Lieutenant-Colonel J. W. Sherwood became Division Surgeon, and continued in this office until October 24, 1918, when relieved for other duty, and Colonel Ebert took his post. It soon became apparent that the administration of the troops would have to be directed from Division headquarters in the Yeon building, and not from the Barracks. Hence the Adjutant's office was at this juncture opened and took over the records of the Division as fast as the men left the Cantonment.

The growth of the Division can be estimated in some measure by the fashion in which it proceeded to spread through the Yeon building. This is one of Portland's largest and finest office structures, and shortly it was over-

run with "gentlemen in khaki ordered west"—to play a slight change on Mr. Kipling's rollicking verse concerning some who were ordered south. The Division began with two small offices on the fifth floor. Then it dropped and sprawled out all over the second, occupying the entire story. This proved inadequate and since it could drop no further, the Division began to climb. It honeycombed the fifth floor, and laid hold of a goodly share of the seventh. The sixth also became decorated with "sprucers." It even climbed 'way up and put out a few tentacles on the eleventh, thirteenth and fourteenth. Finally, the resources of the Yeon building failing, and for economic reasons, some of the departments were moved over to Vancouver Barracks.

A Two Sided Organization

Gradually something like a permanent working organization was evolved. A Military Department under Colonel Stearns was organized, and a Logging and Milling Department under Mr. Hawkins. On the military side the work was segregated into five sub-sections, and on the logging and milling side, or production side, into four; shown most clearly in this manner:

Military Department

a. Logging Squadrons in the Field
b. Riving Operations
    1. Riving Squadrons
    2. Construction Squadrons
c. Division Supply Office
    1. Pay Section
    2. Purchase Section
    3. Issue Section
d. Division Medical Office
e. Cantonment Headquarters.

Logging and Milling Department

a. Contracting and Disbursing Section
b. Inspection Section
c. Traffic Section
d. Technical Section.

The next step in growth was the formation of a Military Information Section under the Adjutant. And so the development went forward. There were many additions to the organization, the segregation of new work into sections and departments as the burdens became more onerous and the need greater. It would be tedious to review these many changes. The problem of organization can readily be seen by contrasting the first simple form with the form under which most of the work was done, and a brief description of the latter will be to the point.

At the head stood General Disque, Commanding Officer of the Division, and President of the United States Spruce Production Corporation. Under him the two phases, military and production, of the original organization still obtained. On the military side was Colonel Stearns, Chief of Staff, with two assistants, Captain O. M. Massey as military assistant and Major P. L. Abbey as industrial assistant. Under the Chief of Staff were ten departments, as here following:

1. The Division Adjutant, Major J. D. Cope, whose duties related to all orders and memorandums, the consolidation of rolls and returns, the keeping of Division records, and the distribution of documents and blank forms.

2. The Division Surgeon, Lieutenant-Colonel J. W. Sherwood, whose duties were as prescribed in Army Regulations.

3. The Division Engineer, Major W. A. Welch, who attended to all construction, extensive remodeling and repairs and things kindred. To this department also fell the tremendously important Division railroads.

4. The Division Inspector, Captain F. L. Gerlach, his duties also being as prescribed in Army Regulations.

5. The Division Liaison Officer, Major Fred W. Leadbetter, who was the Division's representative in Washington, and through whom the Division found contact with the Army, aircraft, and civilian authorities at the national capital, and with the representatives of the Allied European governments.

6. The Division Supply Officer, Major R. S. Eskridge, to whom fell the supplying of all military and production needs. Under this department not only did the Quartermaster come, and ordnance and post exchange supplies; but also the exceedingly vital matters of inspection, priority, traffic and orders.

7 and 8. The Division Intelligence Officer, Captain George Gund, later Major F. S. Howes; and the Division Personnel Officer, Captain Arthur Lee, their duties being as prescribed by Army Regulations.

9. The Industrial Department, under the office of the Chief of Staff; an especially important work, including the Loyal Legion, Information Section, Lyceum Section, chaplains and welfare work.

10. A miscellaneous department, also under the Chief of Staff, including items not properly belonging to any of the others.

Five military districts were also under the Chief of Staff. These were organized when the detachments in the field had become so numerous that it was no longer possible to administer them efficiently directly from headquarters. The territory was divided into districts, and a commanding officer detailed to each of them. This had the effect of relieving the headquarters office, and of providing better oversight for the squadrons in the field. These districts with their commanding officers were: Vancouver Barracks, Colonel Van Way; Puget Sound, Lieutenant-Colonel E. E. McCammon; Grays Harbor and Willapa Bay, Lieutenant-Colonel Henry T. Bull, later Major A. J. Hightower, later Lieutenant-Colonel R. C. Hill; Clatsop, Lieutenant-Colonel Hill,

later Major Hightower; Yaquina Bay, Captain L. H. Brown, later Lieutenant-Colonel J. D. Reardan.

Two hundred and thirty-four soldier camps were established in these districts up and down the coast. The Division at its top strength numbered 26,122 enlisted men and 1,027 officers of the Air Service; to which must be added 722 men of the Motor Transport Corps, 723 of the Medical Corps, and fifty-four of the Quartermaster Corps; also 140 officers of the Medical Corps, forty of the Dental Corps, two of the Quartermaster Corps, six chaplains, two attached officers and five Army field clerks; a grand total of 1,222 officers, and 27,661 men—a personnel of 28,883.

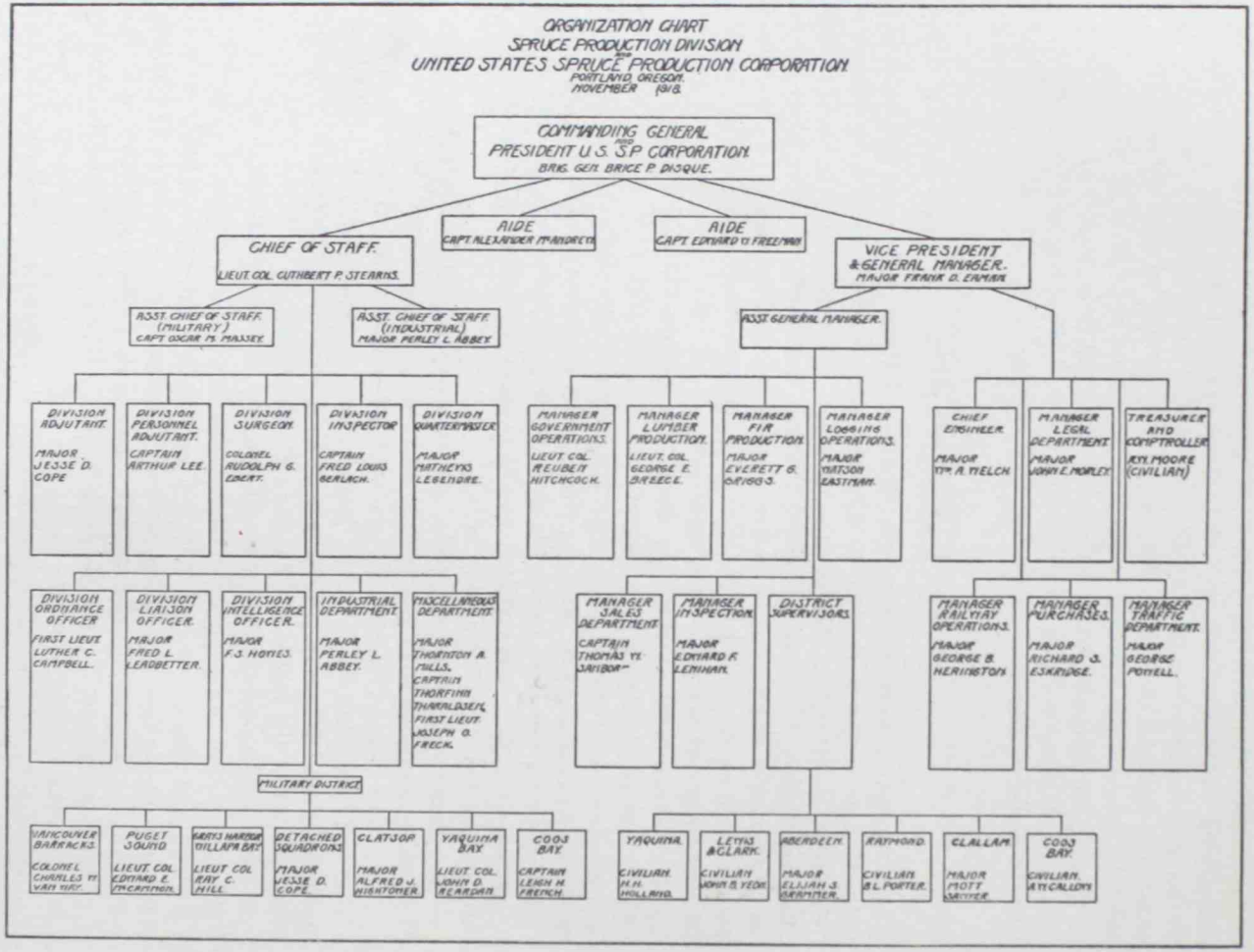
The Production Side

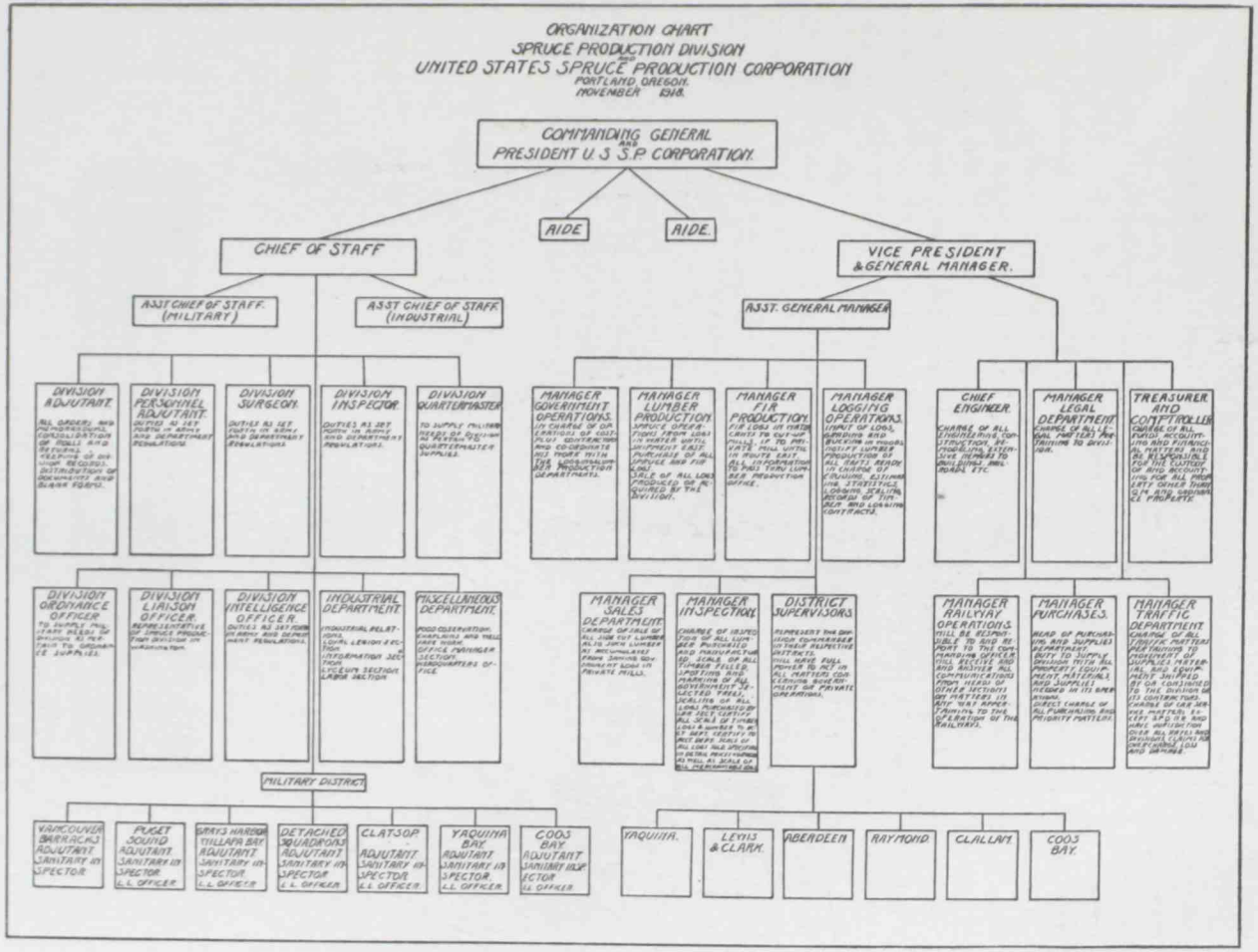
The organization on the production side followed the same general lines as the military organization. The vice-president of the United States Spruce Production Corporation occupied a position corresponding to that of the Chief of Staff. Lieutenant-Colonel Stearns was made vice-president when the Corporation was formed, and consequently headed both sides of the organization, until he surrendered the vice-presidency in November, 1918. Under the vice-president were six departments.

1. Government Operations, under Lieutenant Colonel Reuben Hitchcock, in charge of all cost-plus contracts.
2. Lumber Production, under Lieutenant-Colonel G. E. Breece, who handled spruce logs from the time they reached the water until shipped East.
3. Fir Production, under Major E. G. Griggs, who handled all fir logs from the time they were placed in the water; all information was passed through the Lumber Production office.
4. Logging Operations, under Major Watson Eastman, who had charge of cruising, logging, grading, scaling and the input of logs.
5. The Legal Department, in charge of Major J. E. Morley.
6. The Disbursing Officer, with charge of appropriations, disbursing, accounting, and property. This was at first handled by Captain Crisp, later being placed in the hands of Major C. C. Campbell.

Five production districts were also under the vice-president, corresponding logically, but not geographically, to the five military districts. Each had a district supervisor who maintained general oversight over the Government's operations in his district. They were: Yaquina Bay, Captain L. H. Brown, later Mr. H. H. Holland; Lewis and Clark, Mr. J. B. Yeon; Aberdeen, Mr. T. Hutchinson, later Major E. S. Grammer; Raymond, Mr. B. L. Porter; Clallam, Major Mott Sawyer.

Upon the district supervisor, large authority was conferred. He had full power to act finally on all matters coming up within the terms of the contract between the Government and the Government operator. He could engage independent loggers to operate, if it were deemed advisable. Matters of railway construction and general development came under his hands. He


ORGANIZATION CHART
SPRUCE PRODUCTION DIVISION
OF THE
UNITED STATES SPRUCE PRODUCTION CORPORATION
PORTLAND, OREGON.
NOVEMBER 1918.
COMMANDING GENERAL
PRESIDENT U.S.S.P. CORPORATION.
BRIG. GEN. BRICE P. DISQUE.
AIDE
CAPT. ALEXANDER MANDRES.
AIDE
CAPT. EDWARD D. FREEMAN
CHIEF OF STAFF.
LIEUT. COL. CUTHBERT P. STEARNS.
VICE PRESIDENT & GENERAL MANAGER.
MAJOR FRANK D. EMMAN
ASST. CHIEF OF STAFF. (MILITARY)
CAPT. OSCAR M. MASSEY.
ASST. CHIEF OF STAFF. (INDUSTRIAL)
MAJOR PERLEY L. ABBEY
ASST. GENERAL MANAGER.
DIVISION ADJUTANT.
MAJOR JESSE D. COPE
DIVISION PERSONNEL ADJUTANT.
CAPTAIN ARTHUR LEE.
DIVISION SURGEON.
COLONEL RUDOLPH G. EBERT.
DIVISION INSPECTOR
CAPTAIN FRED LOUIS BERLACH.
DIVISION QUARTERMASTER.
MAJOR MATTHEWS LEGENDRE.
MANAGER GOVERNMENT OPERATIONS.
LIEUT. COL. REUBEN HITCHCOCK.
MANAGER LUMBER PRODUCTION.
LIEUT. COL. GEORGE E. BREECE.
MANAGER FIR PRODUCTION.
MAJOR EVERETT G. GRIGGS.
MANAGER LOGGING OPERATIONS.
MAJOR NATHAN EASTMAN.
CHIEF ENGINEER.
MAJOR WM. A. WELCH
MANAGER LEGAL DEPARTMENT
MAJOR JOHN E. MORLEY
TREASURER AND COMPTROLLER
RAY MOORE (CIVILIAN)
DIVISION ORDNANCE OFFICER
FIRST LIEUT. LUTHER C. CAMPBELL.
DIVISION LIAISON OFFICER.
MAJOR FRED L. LEADBETTER.
DIVISION INTELLIGENCE OFFICER.
MAJOR F.S. HOYES.
INDUSTRIAL DEPARTMENT.
MAJOR PERLEY L. ABBEY.
MISCELLANEOUS DEPARTMENT.
MAJOR THORNTON A. MILLS.
CAPTAIN THORFINN THORALDSEN.
FIRST LIEUT. JOSEPH O. FRECK.
MANAGER SALES DEPARTMENT
CAPTAIN THOMAS W. SAILOR
MANAGER INSPECTION.
MAJOR EDWARD K. LEMMAN.
DISTRICT SUPERVISORS.
MANAGER RAILWAY OPERATIONS.
MAJOR GEORGE B. HERRINGTON
MANAGER PURCHASES.
MAJOR RICHARD J. ESKRIDGE.
MANAGER TRAFFIC DEPARTMENT.
MAJOR GEORGE POWELL.
MILITARY DISTRICT
VANCOUVER BARRACKS.
COLONEL CHARLES W. VAN WAY.
PUGET SOUND
LIEUT. COL. EDWARD E. CHAMPION.
GRAYS HARBOR WILLAPA BAY.
LIEUT. COL. RAY C. HILL.
DETACHED SQUADRONS
MAJOR JESSE D. COPE
CLATSOP
MAJOR ALFRED J. HIGHTOWER.
YAQUINA BAY.
LIEUT. COL. JOHN D. REARDAN
COOS BAY
CAPTAIN LEIGH H. FRENCH.
YAQUINA.
CIVILIAN. W.H. HOLLAND.
LEWIS & CLARK.
CIVILIAN JOHN B. YEON.
ABERDEEN.
MAJOR ELIJAH J. SCHAFFTER.
RAYMOND.
CIVILIAN B.L. PORTER.
CLALLAM
MAJOR MOTT SAWYER.
COOS BAY.
CIVILIAN. A.M. CALLOW.


ORGANIZATION CHART
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AND
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PORTLAND, OREGON.
NOVEMBER 1918.
COMMANDING GENERAL AND PRESIDENT U.S.S.P. CORPORATION.
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CHIEF OF STAFF
VICE PRESIDENT & GENERAL MANAGER.
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CHIEF ENGINEER.
MANAGER LEGAL DEPARTMENT.
TREASURER AND COMPTROLLER.
DIVISION ORDNANCE OFFICER.
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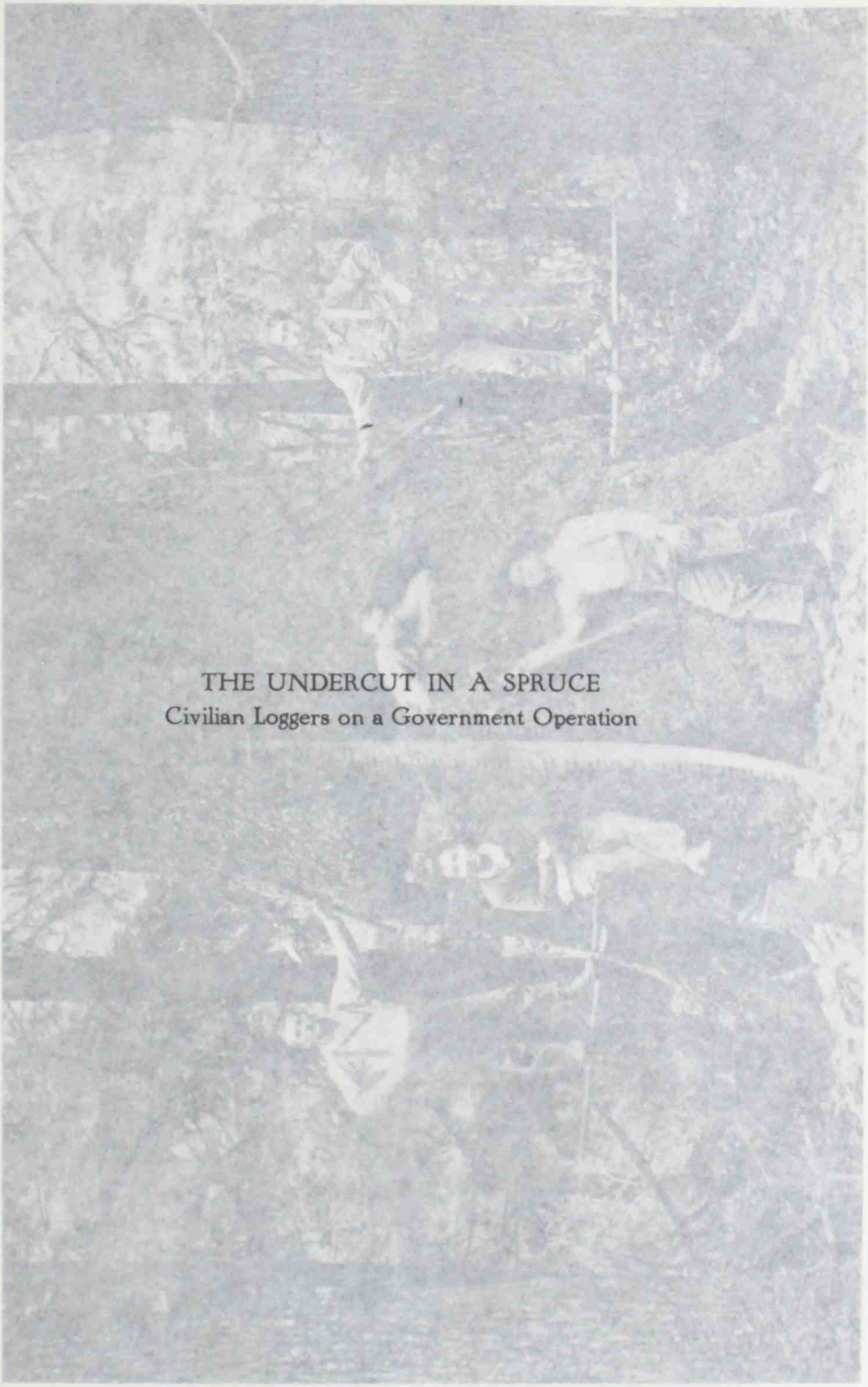
DIVISION INTELLIGENCE OFFICER.
INDUSTRIAL DEPARTMENT.
MISCELLANEOUS DEPARTMENT.
MANAGER SALES DEPARTMENT.
MANAGER INSPECTION.
DISTRICT SUPERVISORS
MANAGER MILITARY OPERATIONS.
MANAGER PURCHASES.
MANAGER TRAFFIC DEPARTMENT.
MILITARY DISTRICT
VANCOUVER (BARRACKS) ADJUTANT. SANITARY INSPECTOR.
PUGET SOUND ADJUTANT. SANITARY INSPECTOR. L.L. OFFICER.
GRAYS HARBOR. TILLAMOOK BAY. ADJUTANT. SANITARY INSPECTOR. L.L. OFFICER.
DETACHED SQUADRONS ADJUTANT. SANITARY INSPECTOR. L.L. OFFICER.
CLATSOP. ADJUTANT. SANITARY INSPECTOR. L.L. OFFICER.
YAQUINA BAY. ADJUTANT. SANITARY INSPECTOR. L.L. OFFICER.
COOS BAY. ADJUTANT. SANITARY INSPECTOR. L.L. OFFICER.
YAQUINA.
LEWIS & CLARK.
ABERDEEN
RAYMOND
CLALLAM
COOS BAY.

was the agent of the Commanding Officer of the Division in his own field. Matters of purely military nature were referred to the military district commander, who was instructed to co-operate with the supervisor to the fullest extent. He could employ such assistants as he thought necessary, submitting his pay-rolls to the Division headquarters office. His remuneration, if a civilian, was one dollar a year and expenses.

The form of general organization was changed somewhat, but not materially, in November, 1918, the chief change being the resignation of Colonel Stearns as vice-president, and the election of Major F. D. Eaman to this office, thus absolutely separating the military and production sides. A Coos Bay district was added to both sides, Captain L. H. French being commanding officer of the military, and Mr. A. W. Callow supervisor of the production district. The "Division Engineer" became "Chief Engineer," and his department transferred to the production side, with Major Welch still in charge. On the production side, in addition, were established five new departments: that of the Treasurer and Comptroller of the Corporation, under Mr. R. W. Moore, later in charge of Major C. C. Campbell; that of Commercial Sales, under Captain Thor W. Sanborn, later in charge of Lieutenant A. D. McDonald; that of Lumber Inspection, in charge of Major E. F. Lenihan; that of Railway Operations, in charge of Major George B. Herington; that of Purchases, in charge of Major R. S. Eskridge, also transferred from the military side; and that of Traffic, in charge of Major George Powell. To the military side were added the Division Quartermaster, Major M. Legendre, and the Division Ordnance Officer, Lieutenant L. C. Campbell. The accompanying charts of organization will depict graphically the relation of the parts to the whole.

The Division at all times was directly under the Bureau of Aircraft Production; and under the Western Department, United States Army, only in the matters of courts martial and supplies.



THE UNDERCUT IN A SPRUCE

Civilian Loggers on a Government Operation

CHAPTER III

The Labor Question

HE history of the military campaign of any army naturally would be the story of the problems encountered; of the difficulties in terrain that had to be overcome; stories perhaps, of the enemy in superior force and superior position; stories of offensives that failed; stories of surprise and attack, and stories of conquest. So it is of this Division of the Army, engaged in and dedicated to the getting out of spruce. Its history is the story of the problems that had to be solved, the obstacles that had to be surmounted.

Stated in its briefest form, the main problem, out of which all others grew, was to increase the production of airplane spruce and fir. At the outset this seemed simple enough. Plenty of spruce stood in the woods of Washington and Oregon, billions of feet of it. The lumber industry of the region was long established, and for many years quantities of spruce had been gotten out. The industry had been supplying the airplane spruce needs of the Allies. It seemed necessary only to centralize the industry on spruce production, and Major Sligh's July report of 1917 indicates that this was the general feeling at the time. What seemed necessary were measures that would insure that the industry, under unusual inducement, and as a matter of patriotism, would turn its attention to the spruce business.

That the problem was by no means so simple is amply demonstrated by the records of the Division for the year 1917-1918. When Major Sligh was relieved, spruce production was somewhat under 3,000,000 feet a month,* with ten per cent. of this stock good for airplane factory use. This figure was slightly below normal, owing to labor conditions in the woods. The I. W. W. had declared a strike in the summer of 1917, and while this had not wholly stopped the input of logs, it very definitely had checked it. Labor conditions were indescribably bad. Conservative estimate placed the labor turnover in

*Actual shipments of aero lumber for August, 1917, 202,264 feet; for September, 2,683,307; for October, 3,495,176.

the industry at the well-nigh incredible figure of 600 per cent. a year; and some estimates of the turnover were as high as 1000 per cent. a year. The operators were in the habit of saying, in bitter irony, that three men were necessary for every job—one going, one on, and one coming. Because the lumber industry is seasonal, and by reason of natural restlessness, workmen were constantly on the move, and constantly losing time. The condition was aggravated by the fact that employers lured men away from one another with the bait of increased wage. The situation was one made to order for the propaganda of the I. W. W., who were able to play up three points on which the lumberjack was sensitive—hours, wages, and living conditions. The ten hour day was the general rule in the camps and mills, and the employers hung to it stubbornly. Living conditions were atrocious. The camps too obviously were temporary, and the abode of any one man in them was even more transient. Probably the root of all labor difficulty in the woods lies in this itinerancy. If the workman is not permanent, why provide a decent place for him to live? Why take the trouble to establish agreeable relationships with him? On the other hand if the camp is not fit to live in, why stay? So the vicious circle went on year by year, with scarcely a chance for improvement, a sinkhole of discontent in which the I. W. W. delegates and agitators could spawn their anarchistic ideas and ideals, with splendid hope of an excellent breeding ground.

The Labor Shortage Phase

The first grave problem, therefore, that General Disque had to face, first chronologically, and probably the first in importance, was the labor problem. The problem had two phases—the one an actual shortage in the labor that was to be had, and the other a problem in psychology, to appeal to the natural good sense, and to the patriotism of the workmen, and provide an antidote for the poison of "wobblyism."

As General Disque saw it there was only one possible way in which to make up the shortage effectively, and at the same time introduce to the industry a factor that would be strongly antagonistic to the prevailing anarchy. It was a method that involved the shattering of all precedent, and the breaking with every tradition of the past. Hurrying back to Washington he laid before the War Department the plan of assigning soldiers from the National Army to work in the woods, particularly those who might have had some previous lumbering experience. The idea was approved, and a plan worked out by the Department of War, the Department of Labor, and Mr. Samuel Gompers, head of the American Federation of Labor. A contingent of 10,000 men was first authorized, and of these, 5,000 made their appearance at Vancouver Barracks early in December, 1917.

Thus the Division became a Division. Thus the idea of an "office of inspection" was scrapped. Thus a new Front of the Great War was established. It was an unprecedented thing for soldiers to be ordered to civilian

duty. But it was to meet an unprecedented condition. Rules are made for exceptions, and exceptions are made to cover exceptional circumstances. No other expedient could possibly have had the wholesome effect that the placing of the soldiers in the woods had. No other expedient could have created a certain supply of labor.

The sending of the soldiers into the woods introduced at once a big problem in military administration, which problem was placed in the hands of the adjutant (at first, Colonel Stearns, later Major Cope) and his Section for solution. Not only was this Section charged with ordinary military administration, but also the supply of soldier labor to the logging and milling concerns. The original intention in the matter of soldier labor was that it was to be merely supplementary to that already on the ground. The idea of Government cost-plus operations, and the use of soldiers for these, was a later development.

The problem was perplexing, because the men were scattered in small detachments all over the west coast region of Oregon and Washington. Every movement of every detachment, or indeed of every individual, required a separate order, which necessitated the inauguration of a careful check on the issuance and receipt of orders. The Section was also the mouthpiece of the Commanding Officer, and through it the entire Division, both civil and military branches, functioned.

Soldiers were not sent into the woods except on written request. It had to be made abundantly clear that the soldiers would not take the place of loyal civilian loggers and lumbermen. In addition it had to be made clear just what production was expected from a given operation, and if the results in providing lumber needed by the Government would justify the use of the soldiery. Also, living conditions were investigated, the food question was looked into, and in general all matters pertaining to the welfare of the men. Where these were found satisfactory, or made satisfactory to an Army inspector, the troops were sent.

The Soldiers and Civilian Pay

The soldiers in the woods received the community civil wage. When this was learned the hammer squad at once armed itself and went into action, inquiring acidly why the "sprucers" should have this wage advantage over the men in the trenches. Even a casual review of the matter will reveal the answer to the ordinary intelligence. If the operators had been permitted to employ the men at soldier wage, the cry of "special privilege" would have been raised; and with justice. The civilian labor would have had a just complaint on the score of "unfair competition." So would competing operators who did not have soldier labor. Again, to induct men into the service and compel them to do civilian work without corresponding pay, would unquestionably have been "conscription of labor." To obviate all this, it was clear

that the wage relation of the soldier workman to the operator must be exactly the relation of the civilian workman.

But because the soldier was Uncle Sam's man he must receive pay as such. Nothing in the way of discipline or control would have been possible unless this were so. And this factor made adjustment necessary, because it was not just that he should receive wages in both capacities. So the following arrangement was made. The soldier received his military pay, and the operator paid him the going wage for his work, minus the military pay, which sum the operator paid to the Government. This seems a little complicated at first glance, but it was a necessary measure to secure justice and fairness all the way 'round. The soldier also received his regular army ration allowance. This, too, was deducted from his civilian pay, and sent by the operator to the Government. The operator, as with all his workmen, supplied a mess, for which the men paid at the universal rate agreed upon, $7.35 a week.

The Psychological Phase

But the labor problem was by no means solved when the actual shortage was cared for. The psychological effect, on the civilian logger, of the presence of the soldiers in the woods was pronounced and beneficial. It obfuscated the disloyal and anarchistic tendency, and bolstered up and supported the loyal men. But it was in itself insufficient as a solution for the problem already referred to, as concerning the general unrest of labor and its itinerancy. The war seemed to be a signal for increased activity of the I. W. W., just as, at a later period, the signing of the armistice seemed to offer another opportune occasion for the "wobbly" organizer.

When General Disque came to the Northwest, the "wobbly" was virtually in charge in the woods. The character of this menace is seen, even with a cursory examination of I. W. W. literature. The first sentence in the preamble to the constitution of this organization is to the effect that the worker and the operator have nothing in common. Its theory is so to disorganize industry by various methods, lawful and unlawful, chiefly the latter, that it will be unprofitable to the owners; at which juncture the worker is to step in, take control and operate to his own benefit. Briefly, therefore, wobblyism begins with a lie and ends with a mirage. Its philosophy is based upon the righteousness of retaliation, and the unrighteousness of property; it is therefore both ethically false and economically false. Nevertheless the appeal for "the one big union" was a strong one; conditions in the camps made for discontent and grievance, not only fancied, but real. The wobbly delegate was undoubtedly inflammatory, but he possessed, unfortunately, the additional advantage of having plenty of inflammable material.

Not always was the weapon of the open strike utilized. More subtle ways were found to be just as effective, if not more so. The "strike on the job" became popular, and "conscientious withdrawal of efficiency." This meant merely that the men would go through a sufficient number of motions

to hold the job down, but persistently do as little as possible; the theory being that although ten hours were actually put in, there should be the equivalent of only eight hours work, or even less. Efficiency awards and speeding up are the pet abominations of the wobbly creed.

Sabotage was a favorite weapon and became a sort of watchword, openly advocated, and secretly employed. Sabotage means anything that will slow up the industry and halt production. It may be violence, or it may be mere annoyance. (The saboteur does not use violence unless necessary—like the honest gambler who will not take money from a friend unless he needs it.) The workmen pestered each other, hid each other's clothing, purposely mislaid tools, removed essential parts of machinery, to say nothing of methods too filthy to be mentioned. Little hesitancy was felt about the employment of devices that endangered life and limb. Spikes driven into logs, or bits of iron concealed in them, not only ruined saws in the mills, but also jeopardized the lives of men working in the vicinity. When opportunity offered, dynamite and other explosives were employed to wreak destruction, and arson was a quick and sure method of putting a plant out of business, perhaps for months.

With such a system ravaging the industry the impossibility of increasing production materially was only too apparent. It was necessary to find some vehicle by means of which the Government representatives might reach the entire industry, some means of checking the enormous labor turnover, some method of combating the I. W. W. influence and of curing the labor unrest.

The Loyal Legion Makes Its Bow

General Disque's resourcefulness at this juncture is seen in his happy inspiration of forming an organization that should be both more and less than a "union," and which might bring employer, employee, and the military oversight together. Of this inspiration was born the Loyal Legion of Loggers and Lumbermen, exemplifying in a marked degree the Disque policy of "get together." A patriotic pledge was prepared, and each signer was furnished with a card and a badge of unique and attractive design.

The Loyal Legion office was the first established in the Division, and a detail of officers for this work was made from the first group sent to Portland. The coast region was divided into seven districts and an officer sent into each one to visit every camp and every mill to talk to the men, securing signatures to the pledges and leaving behind him a "local" with a secretary of his appointment. This work was begun during the first days of December, 1917, and from the outset was a pronounced success. The number of locals and of men enrolled mounted rapidly. The experiences of the organizing officers were many and varied, and their patience often sorely tested. But there is nothing on record to show that in any camp or group where the attempt was made, the officer failed to leave behind him a unit of the new

organization. Headquarters of the Loyal Legion were established with Captain (then Lieutenant) M. E. Crumpacker in charge.

The officers urged the men to forget their troubles with their employers, and devote all their energies to the getting out of Government war material; and promised faithfully that the military would investigate all conditions and see that the men got a square deal in return for patriotic zeal in their work, a promise that was strictly fulfilled. The overwhelming response to this line of endeavor stands as unmistakable evidence of the inborn loyalty and sense of fairness of the great majority of the lumberjacks and loggers in the Northwest woods.

Ten thousand members were enrolled the first month. Additional officers were placed on the detail, and at the end of six months the membership in the coast region alone stood at over 80,000. Meantime, because the labor conditions in the Inland Empire (Eastern Washington and Oregon and the Idaho panhandle) were a reflex of those on the coast, it was considered wise to organize this region also, and L. L. L. L. locals and secretaries appeared everywhere throughout this interior country. A Legion office was established in Spokane with Captain E. D. Birkholz in charge. By October, 1918, a total of nearly 1,100 of these locals had been organized in both coast and inland regions with a total membership of about 125,000.

On four different occasions, delegates representing these workers met in conference with General Disque. The first of these meetings was held in Portland, March 4, 1918, a second Portland meeting being held August 5. The other two were held for the Inland Empire loggers in the city of Spokane, on June 27, and on August 12. Similar conferences were held at about the same time with representatives of the operators.

Few more interesting or more spicy conventicles could be gotten together than these meetings of the men from the mills and the woods. They are great debaters. They "make it snappy." They speak briefly and very, very, much to the point, as a rule. They are apt to forget parliamentary procedure, and not always is the motion before the house spoken to. When the crowd becomes weary of a speaker, or disapproves heartily of what he has to say, they invite him to "Sit down!" with so little of uncertainty that he usually sits. But as a rule it is straight talk, level-headed talk. They know what they want to say, and how to say it with forcefulness. Grammatical solecisms are freely indulged in, but somehow this seems rather to add to than detract from the speaker's "punch." However, it is by no means an unlettered gathering. Many of the men are constant readers, and have splendid vocabularies. It is doubtful if there could be held a convention of the workers of brain or brawn in any line, with the exception of those with whom public speaking is more or less professional, that would show as much forensic ability.

At these meetings—both those of the workmen and those of the operators—resolutions were passed placing in General Disque's hands the final decision in all matters relating to hours, wages and living conditions. Thus was passed to the Commanding Officer of the Division the biggest "buck"

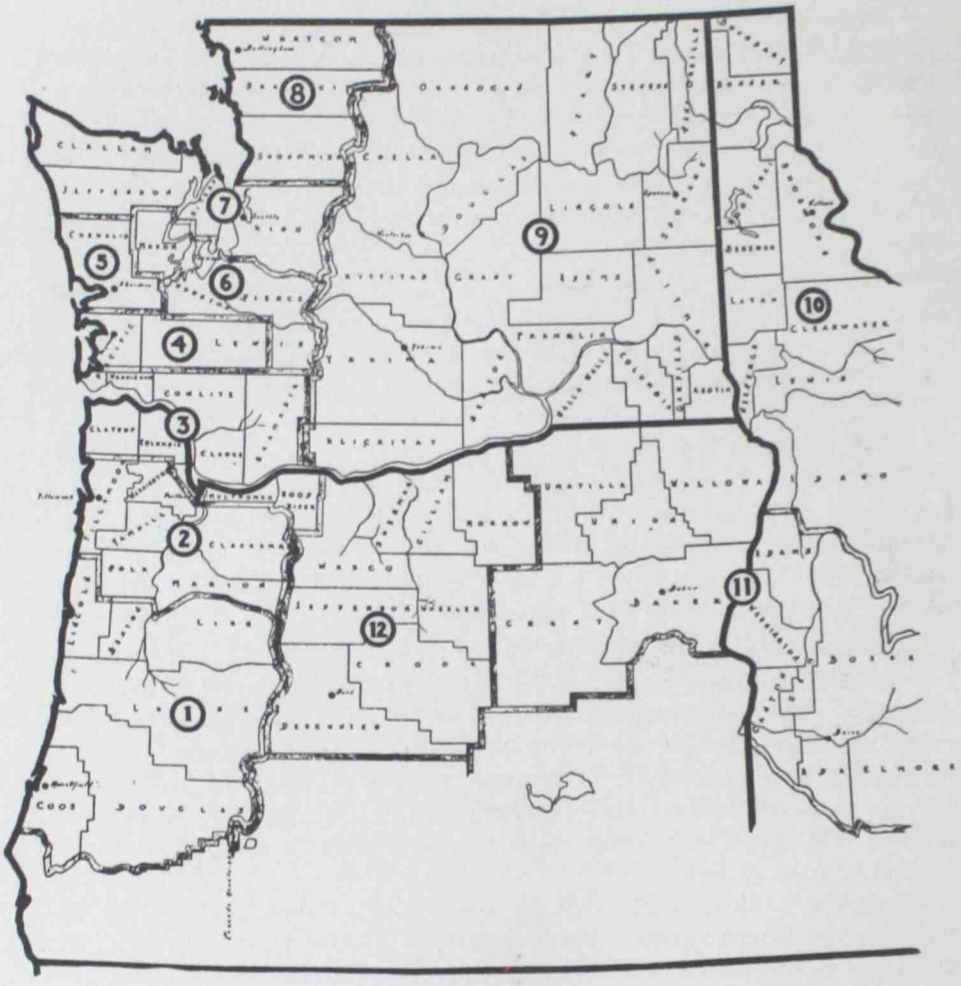
on record. But though the responsibility was a great one, it necessarily was accepted, and accepted gratefully. The position of arbitrator was tremendously important; it gave him precisely the leverage necessary to keep things running smoothly and to speed up the production of lumber for war needs.

Through the Industrial Relations Section, wage scales were promulgated for both the Coast and Inland Empire regions, which were very generally lived up to without trouble. Changes were made from time to time as the need became apparent. One of the peculiarities in the situation was the fixing of a maximum wage. Minimum wages have been fixed in many lines of industry, but it seldom has been necessary to fix a maximum. In this case it was necessary, to prevent the turnover resulting from employers bidding against one another.

The record of accomplishment of the Loyal Legion reads almost like an industrial fairy story. Foremost among the tangible results was the establishment of the basic eight-hour day, which went into effect on the coast March 1, 1918. For a quarter of a century the hour question had been a bone of contention between operator and employee, and with at least some of the former the ten-hour day was something approaching a religious conviction. Yet even the most stubborn yielded the point, and agreed to stand behind the eight-hour day, with time and a half for overtime. The new hour schedule came by the action of the operators themselves, but nevertheless it was an innovation that could not have been brought about except for the new spirit which the Division's presence imparted.

Second only to this advance was the improvement in living and sanitation conditions in the camps. A survey was made by sanitation officers covering 900 different camps and mills, a pamphlet published on the subject of camp sanitation and placed in the hands of every operator, with the recommendation that conditions be brought up to the standard indicated. Old latrines were condemned, bath houses added to camp equipment, bunk houses cleaned and freed of vermin. Reading rooms were established in several hundred of the camps.

Strikes, sedition and sabotage were wholly eliminated, so far as any open action is concerned. Many members of the I. W. W. undoubtedly remained in the woods, but their influence was reduced to a minimum where not completely nullified. The labor turnover was very materially reduced—from six hundred to a thousand per cent., down to thirty to fifty per cent. Most of all, a big increase was made in the quantity and quality of lumber produced, with a substantial reduction in the cost per M to the Government. The patriotism of the men was nurtured by the suggestion that they erect in each operation a flag pole, flying the Stars and Stripes, a suggestion which received an almost universal response, the expense being borne by subscription among the men. A flag ceremony was inaugurated corresponding in a general way to the military reveille and retreat. Each day before beginning work the men stood in their places at attention while the flag was being raised, and again in the evening while it was lowered.



GEOGRAPHICAL DISTRICTING SYSTEM
of the Loyal Legion of Loggers
and Lumbermen

The advantage of the new organization was that it offered means of direct contact between General Disque and the entire industry, both operators and operatives. A monthly Loyal Legion magazine, called "The Monthly Bulletin" was prepared by the Information Section under Mr. Spencer Best, and distributed among the men, 80,000 to 90,000 copies going out each issue. Originally distributed free of charge, the men later paid fifty cents for a six months' subscription. The Information Section also got out a weekly bulletin, and a weekly war summary, both mimeographed, giving the men the latest official news regarding the progress of hostilities. Through these channels practically every man in the organization was regularly reached. Each local was equipped with a bulletin board, and each secretary instructed to place all bulletins issued from headquarters thereon. Moreover, machinery was provided so that each man could reach headquarters with grievance or complaint. At each local a complaint box was provided, which was emptied every week by the secretary, and the contents forwarded to Loyal Legion headquarters. Each letter so received was given individual attention.

The Bureau of Morale

A co-ordinated department of the Industrial Relations Section was the Lyceum Section, which had its inception in the summer of 1918. This group of officers dealt with the strictly human element in the Division—that imponderable, impalpable thing men call morale, that curious and indefinable thing known as *esprit d' corps*.

When this section came into existence the Division, on its physical side, had become a giant. It possessed millions of feet of spruce and fir. It controlled vast quantities of equipment. It owned railroads and industrial plants. Attached to it were nearly 30,000 soldiers and over 100,000 civilians. Here the human element entered in. These workers were supplied with everything to work with. They were organized into the Loyal Legion; they had their monthly magazine. The tangible things were at hand. The intangible problem remained. There is an ancient saw touching upon the feasibility of bringing a horse to water without being able to compel him to drink. In the case of the Division, the "horse" had been brought to water. It was the task of the Lyceum Section to make him drink—and especially to make him like it.

In June, 1918, came Major T. A. Mills in response to the call of General Disque, to take charge of this work. He began at once the organizing of his Section. He scoured the country for men who had the required experience, to make up his "bureau of morale." One of these men was a professional soloist and song-leader; another was a director of athletics; a third was a finished violinist; the others were men of long platform experience, some of them of wide reputation. Besides, the Section included six chaplains sent to the Division by the Adjutant General's Office. Of these three were stationed at Vancouver, one as chaplain of the First Provisional Regiment at the old barracks, one at the Cantonment, and the third as chaplain of the Second

Provisional Regiment at the Cut-up Plant. One of the activities of the last named was the creation of a weekly paper called "Straight Grain," at first the organ of the Second Provisional, but later extended to cover the entire Post. The remaining chaplains were scattered in permanent stations up and down the Pacific coast.

The other officers of the Section were sent into the woods to visit the camps of both civilians and soldiers. It was their business to keep up the patriotic enthusiasm of the entire personnel to the highest possible pitch, to engender good feeling between employer and employee, to preach the gospel of co-operation, to make the men themselves feel the true importance of their work, and impart to them the animating spirit of speeded production. They talked, sang, entertained; they answered questions, and gave information; they operated moving picture shows. It was a unique and novel work for most of them; and a unique and novel war-work—this traveling into the remote forests to educate, to instruct and to inspire. Sometimes they had the use of halls or theaters in small towns where the population would be largely mill men or loggers. But more often their voices were raised in dimly-lighted cook-houses and bunk-houses, before the camp crews seated on benches and tables. or even on the floor.

It is difficult to estimate the results of such work. Its effect is cumulative rather than immediate; and no thermometer has yet been devised to register the warmth of a man's spirit. The Section was at work scarcely long enough to get its full effectiveness into play, when the German debacle on the Western Front rang down the curtain on its activities. The only available index is the enthusiasm with which the Lyceum officer was urged to "come again," and the better atmosphere which he seemed to leave behind him.

In this connection honorable mention must be given to the very real help rendered to the Division by the Y. M. C. A., the Knights of Columbus, the War Camp Community Service workers, the American Library Association, and—last, but not least—the American Red Cross Society. They all contributed to the welfare and the spirit of men who were engaged in a service for their country which was for many of them literally as far from home as the fields of France, and certainly dreary and trying in its own way.

Machinery of the Organization

Naturally this labor program, especially the organization of the Loyal Legion, met with bitter opposition and antagonism, in spite of the splendid record of accomplishment. Those who had lived on the strife between capital and labor in the past dreaded and detested the sight of capital and labor getting together. It was the War Department which originally had authorized and financed the Loyal Legion. Yet it was charged with being a creature

of the employing class, designed to get the men under control, and make "slaves" of them. Men were warned against signing the Legion pledge, because, it was stated, the men thus gave up their civil liberties, and were placed under the same discipline as the enlisted soldier. General Disque was charged with bad faith, and with having the interest of the operators, as against that of the men, at heart. Such charges were met by the General with vigorous denial, and a challenge to his contemners to prove their charges, which of course they were unable to do. Invective was the only argument they were able to produce. The Legion throve in spite of attack, and each passing month saw it grow in numerical strength and in internal cohesiveness.

As finally developed, the organization was built upon mutual contact between employer and employee, at each successive stage. In each operation there was elected by the employees a local conference committee of three members, one of whom was the local secretary, at first appointed, but later always elected by the local. The local committee took up with the employer any questions that arose concerning purely local industrial relations.

Next above the local committee stood the district committee. The entire territory was divided into twelve districts, eight on the coast and the remainder inland. A committee in each district was created, consisting of three representatives of the operators and three representatives of the workmen. The former were appointed by General Disque, and the latter elected by a convention of the local secretaries within that district. To this committee all questions pertaining to the district were referred; the district committee also acting as referee for such questions as could not be agreed upon in the local conferences.

Each of these groups of three had a chairman, and these twenty-four chairmen—twelve being operatives and twelve being employees—constituted, with Major Abbey, head of the Industrial Relations Section, the Central Council, which was the final court of appeal in all matters pertaining to the industry, Major Abbey sitting as chairman of this Council. In case this Council could not come to agreement, the matter was referred to General Disque as arbitrator and final authority. It is noteworthy, however, that though the Council had some spirited sessions, no case was passed up to the General; the point being, of course, that the two groups found no barrier between them that could not be surmounted by mutual agreement. The admirable feature of the plan may be readily seen. It takes in the employee, and gives him an equal share in shaping the policy of the entire industry. Anything so radical could not have been dreamed of in the Northwest in the years before the war. It is one of the indelible marks that the Division has left upon the lumber business of the section, and should the Legion continue during peace times it means the end of industrial strife in the Northwest logging and milling industry.

If one were asked what instrumentality made it possible to increase the production of airplane lumber from about a million in October, 1917, to twenty

millions in October, 1918, the answer might well be that four contributing factors made this remarkable achievement a reality. For the first three months of the period it did not seem humanly possible to meet the Government's demand. About this time several things occurred. The first was the opening of the Cut-up Plant at Vancouver, the story of which will be told in succeeding pages; the second was the authority given to General Disque to commandeer stocks of spruce; the third was the establishment of the basic eight-hour day; and the last, but by no means the least, was the organization of 125,000 patriotic men in the Loyal Legion. Without the aid of these four factors it is difficult indeed to see how General Disque could have accomplished the task set before him.

CHAPTER IV

The Problem of Equipment

N INDUSTRY need not break down completely in order to fail. Every industry is made up of essential links, and if any one of these links should fail the industry is brought to a standstill. Labor is such a link; and, in the case of spruce production, equipment constituted another. If labor conditions presented a problem that must necessarily be solved, not less is to be said of the matter of equipment. The laborer is helpless without the tools with which to do his work, no matter what his sentiment may be, nor what his ability may be. After the labor problem, the big question that menaced seriously the production of airplane spruce and fir was the question of providing equipment.

The equipment problem begins with the story of wire rope. Wire rope! As incidental a commodity as one might imagine. Yet its lack, in the winter months of 1917-1918, seriously threatened the war program of the Allied world. For the war program depended on spruce and fir lumber. And spruce and fir lumber was in turn dependent on spruce and fir logs. And to secure spruce and fir logs one must have wire rope—tons of wire rope, miles of wire rope. For chiefly the logging operation in the coast region with its rugged terrain, employs the donkey engine; and the donkey engine is as useless without its wire as a firemen's ball without music. It is the duty of the donkey to gather to itself the logs from a radius of a mile or more; or to haul them along the skids; or to load them upon the cars. And the arms that it employs are long tentacles of wire rope.

When the magnitude of the operation is taken into consideration—hundreds of logging "shows," using hundreds of donkeys—it will easily be guessed that the wire rope requirements would be huge. Various factors in the situation rendered the wire rope shortage most grave. Some loggers were hoarding rope. The increase in the production of spruce and fir was rendering previous rope requirements obsolete. A little clique of profiteers existed, determined upon milking the situation for all it was worth. Moreover, rope being made of steel, and steel being a commodity for which there

was high demand in other war fields, very little rope was being shipped to the Northwest. Not more than a hundred tons were in the region, or in transit thereto, and the normal requirement had risen to 900 tons a month. Someone made the guess that there was as much as 5000 feet excess rope in the woods when General Disque came—about as adequate as one cup of tea at a British afternoon lawn-fete. And this was no tea-party.

Conditions reached such a stage in January, 1918, that it was deemed necessary to form a Wire Rope Section for the Division, and Captain (then Lieutenant) Irwin D. Wolf was called upon to take charge. The Section was placed under the supply department at first, which was in charge of Major R. S. Eskridge, but later the business grew so much in volume and in importance that it was made independent. After the formation of the Corporation, the matter of priorities fell under the department of the Manager of Purchases.

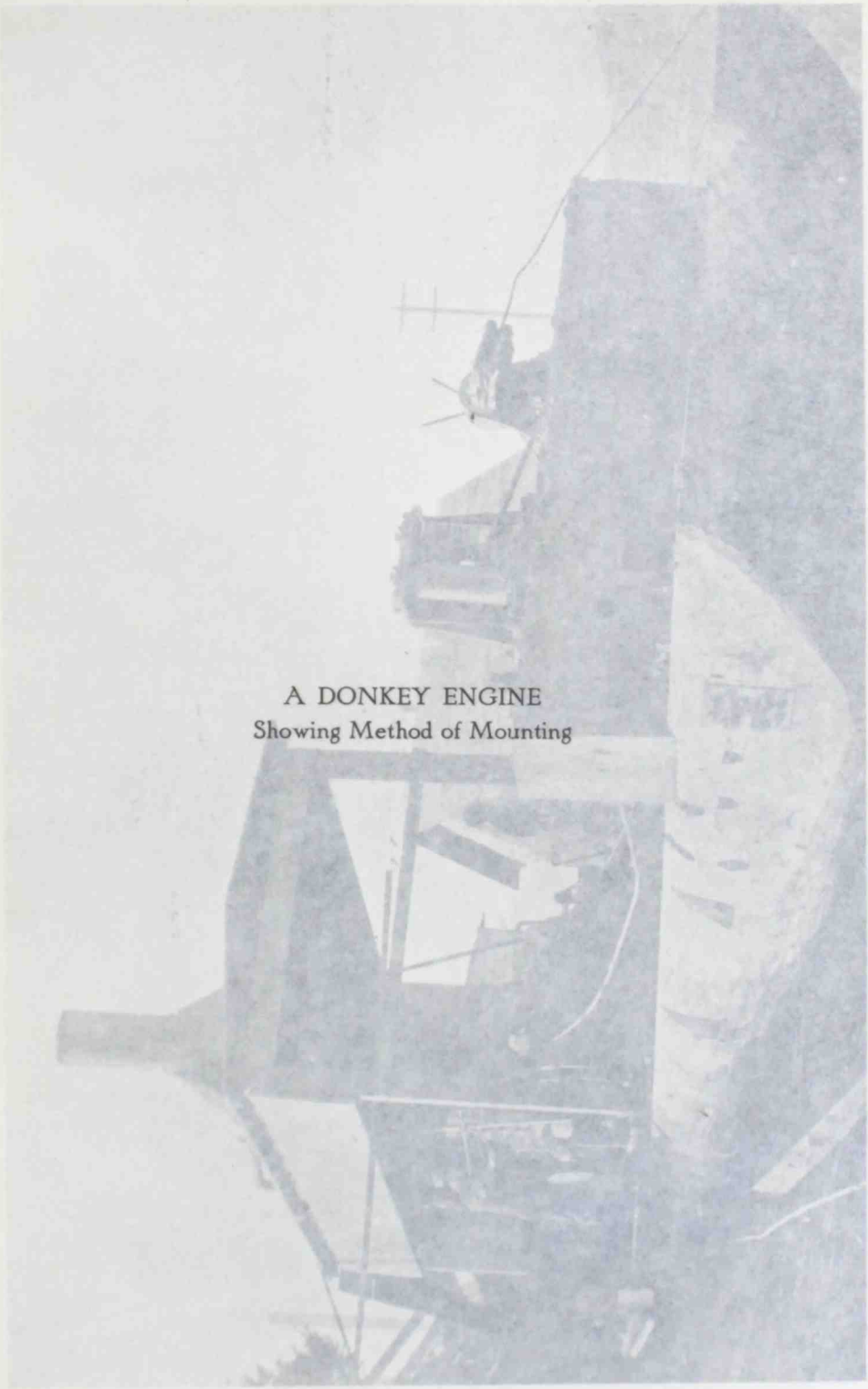
Winding in the Wire Rope

Captain Wolf saw that his problem was an extremely simple one. It was merely to make the supply equal to the demand. The fly in the ointment was that there was no supply to speak of. The first move was to commandeer all the available stocks in Portland, Seattle, San Francisco and other coast cities. This netted 400,000 feet—almost enough to keep the industry going for two weeks. The Section also found that the Broderick and Bascom Rope Company factory in Seattle had been idle for a year, owing to lack of raw material. Immediate steps were taken to supply the lack, and 200 tons of raw wire were secured, the manufactured rope to be distributed by the Wire Rope Section. In addition, a written promise of 400 tons of wire rope a month was secured from the Pacific coast works of the United States Steel Products Company, located at San Francisco. This was a hundred per cent. increase over prior deliveries, and was contingent upon the Wire Rope Section's ability to furnish raw material.

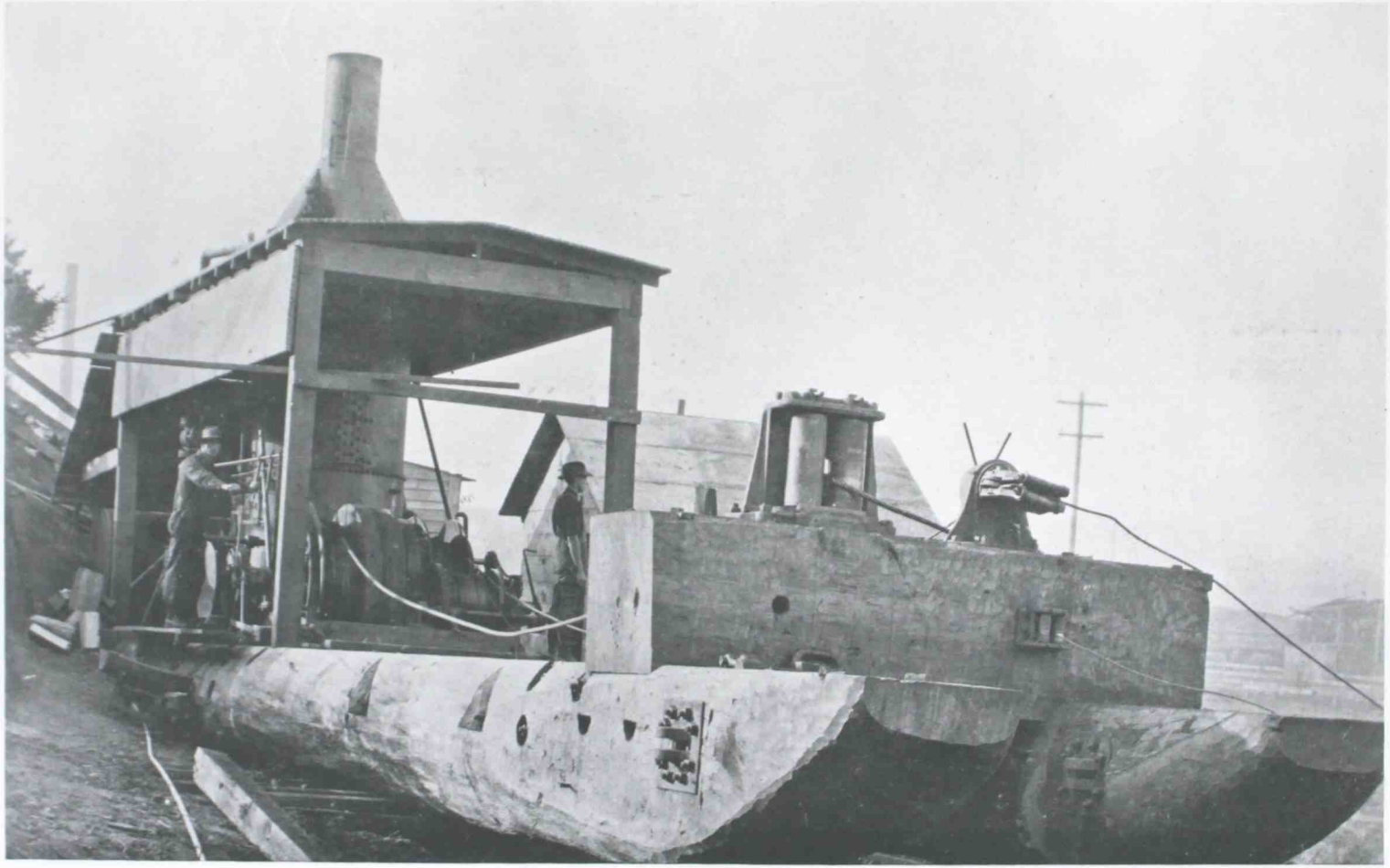
It was quickly discovered that the only thing possible was to cut out all non-essential logging; or indeed non-essential industry of any sort that used wire rope. The first determination to be made was the rock-bottom requirement of the essential industry. To arrive at this a questionaire was sent out, which it is worth while to quote in full because it was identical in form with that ultimately used for all commodities of which the Section took full charge.

"It is the intention of this Division," the form reads, "to provide, if possible, against a shortage of wire rope. By filling out the blank below, and mailing it promptly to this headquarters, you will assist us greatly by giving us the statistics necessary for this compilation." The result of the returns on the questionaire showed a demand for 6,000,000 feet for six months.

The next move was to gather together representatives of all the wire rope dealers and manufacturers in the country, and they met in conference in Portland on February 14, 1918. After a two-day session, the question



A DONKEY ENGINE
Showing Method of Mounting



finally was put: "Will you agree to trust the distribution of all wire rope, both that on hand and that to be shipped in, to the officers of the Spruce Production Division?" They didn't know. They must have the endorsement of any such agreement from the several home offices. To secure such endorsement entailed a good deal of telegraphic correspondence, and required a good deal of explanation. There was a natural reluctance on the part of the manufacturers. But they were eventually persuaded that what seemed to be high-handed interference was nothing more than the situation demanded, and agreement finally was reached, placing the distribution of rope in the hands of the Division. The agreement covered every dealer in the country and gave absolute control of the distribution of this commodity in the states of Washington and Oregon. In return for the agreement, the Section undertook to procure priority on a sufficient quantity of rope to meet the demand.

Thus the struggle entered a new phase, and battle royal ensued over the telegraph wires between the Wire Rope Section and the Priorities Committee in Washington. The latter was loath to grant any blanket priorities, but insisted that each case of the needs of each logger be separately brought up. The Wire Rope Section contended for the plan of compiling a total of all war needs in the Northwest, and submitting them month by month, three months in advance, to the Priorities Committee. Two points of view so entirely at variance are not easily reconciled as a rule; and this case was no exception. The Division officers had a hard battle to convince the eastern authorities of the necessity for their contention. But convince them they did, and events demonstrated that this was the proper method of handling distribution. The plan developed so successfully that the War Industries Board recommended it to the Imperial Munitions Board of Canada.

Formation of the Priority Section

It soon became apparent that this Section and its policy must be widened to include things other than wire rope, and a Priority Section was formed with the distribution of wire rope and donkey engines as a nucleus. Donkey engine manufacturers were called into conference on February 22, and an agreement signed similar to that made with the manufacturers of wire rope. Under these agreements a total of about 18,000,000 feet of wire rope has been supplied to the industry, and about 400 donkey engines. As war figures go, this last does not seem very large. Yet it represents a money value of $2,000,000.00.

From this time forward the business and responsibilities of the Priority Section grew rapidly, as the distribution of first one commodity and then another came under its charge. A broad policy was adopted March 12 to cover all supplies, by which it was decided that all applications for equipment would be approved by the Priority Section before being sent on to the Priorities Committee at Washington. For each commodity, a questionaire was sent out in wording exactly like that sent out for wire rope, with the change only

in the name of the commodity. In general the same plan was adopted for each, and it is noteworthy that the plan as originally drawn actually stood the acid test of experience and was never changed. Records were kept, of a simple but accurate sort, that showed at a glance how much of any commodity was in stock, where it was located, and to whom any quantity had been released. These records also kept track of the requirement of each operation. Dealers reported sales daily, and each week reported an inventory of stock.

Loggers require clothing, and clothing requires wool, so that wool was an item early drawn under control of the Section. Shoe leather was still another item, and it was necessary to go one step further back and supply the machinery for making the shoes. One hundred and twenty-five thousand pairs of loggers' shoes were supplied, made necessarily of nothing but the finest and stoutest leather. The Section controlled the distribution of all iron and steel in the region; and chain and shafting fell into the same category.

But the Section had to do not alone with items over which it exercised absolute control. A very clear line of demarcation must be drawn between those commodities which were controlled, and those which the Section supplied without the advantage of control. The recapitulation of the quantity and variety of supplies secured by the Section would make tedious reading—something like a cross-section of a mail order catalog. It is sufficient to say that the average weekly issue of priority certificates was thirty, and the total money value for all of these ran well up into the millions.

There was steel rail for instance. The Section supplied 400 miles of rail, enough for a pretty fair sized road. It supplied thirty to forty tons of high grade steel for axe-heads and other tools. And speaking of axes, there is an item of 68,000 dozen axe-handles in the records of the Section, supplied for the use of the men in the woods. Three thousand tons of pig-iron found their way into the spruce game through the instrumentality of the Section. The scrap-iron matter was delved into. And there were choker-hooks and brush-hooks, boilers, sawmill machinery of all sorts, and a wide variety of miscellanies, too numerous to mention.

To say nothing of "tin pants." The men called them that. They are made of a special water-proofed fabric, to serve as a protection for the logger against the eternal winter rains of the coast region. Men take their oath that these garments will stand erect of their own uprightness, and without hitching. Some go so far as to say that the trousers can be gotten into only by means of a trapeze, or a block and tackle, and that they are put together with copper rivets. But this, doubtless, is an exaggeration. Nevertheless the water-proofed clothing is a prime necessity, and the Section supplied half a million yards of the material for making it.

Drastic action also became the order of the day with reference to the fuel oil shortage. This situation was particularly complicated by the fact that the Pacific Coast Petroleum War Service Committee at San Francisco, on a

priority list prepared for fuel oil consisting of twelve classes, had placed loggers and lumbermen in the eleventh class. Many logging operations are impracticable without the use of fuel oil for the locomotives, and these would have been closed down had the low classification been allowed to stand. After a hard battle, the Priority Section secured a change in the classification from eleven to one, thus enabling those loggers who could not operate successfully without oil to secure a supply.

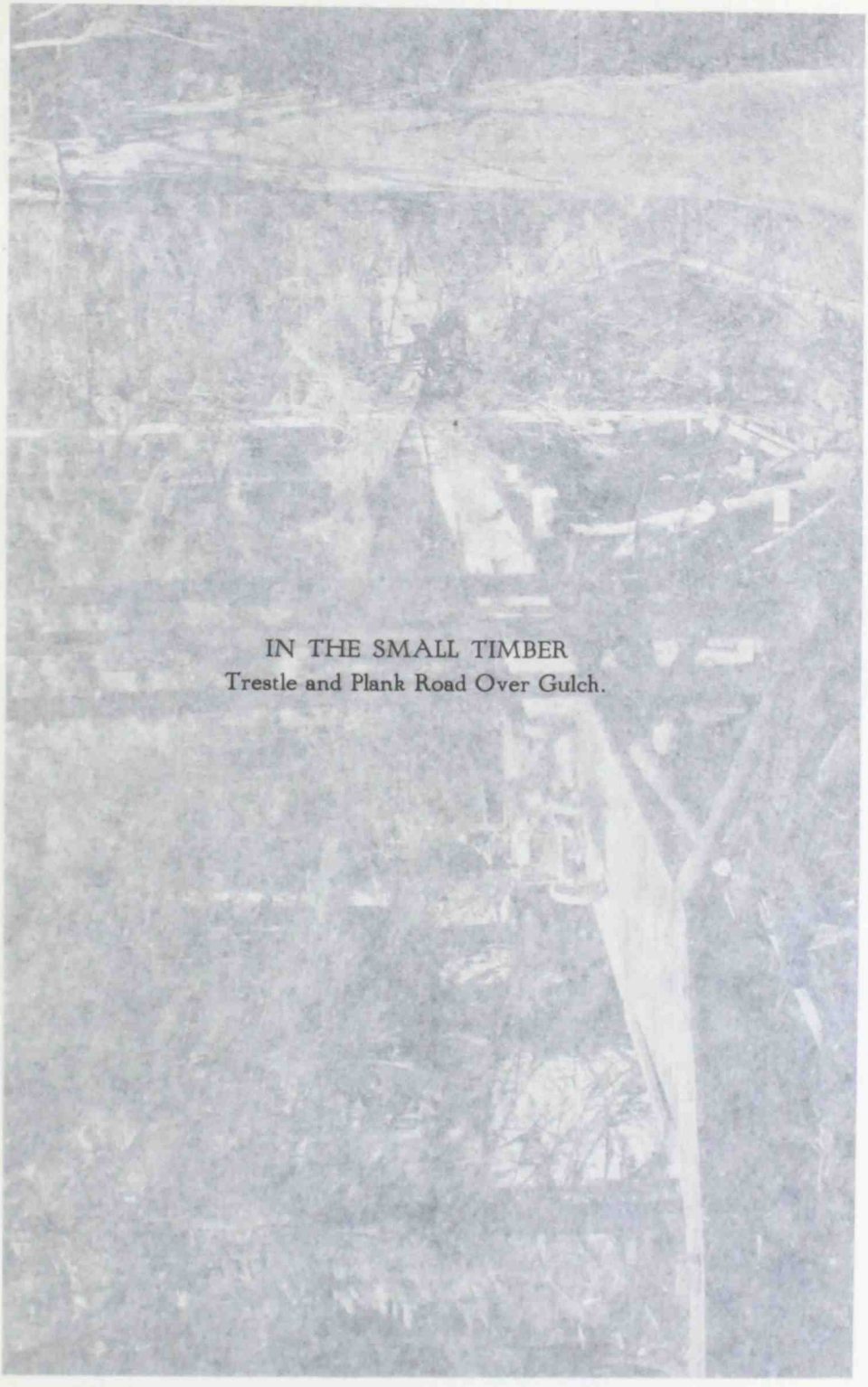
Standardization

The Section had a hobby. Not that they rode it to death, as is the manner of men with hobbies. On the contrary, they rode it to some purpose. This hobby was standardization. It got in some splendid work in the matter of donkey engines. When the military took hold there were thirty-one types of donkey engines being manufactured. Under the persuasive influence of the Section, (it had control of the distribution of donkey engines, but not of the production) this number of types was reduced to six, and production thereby doubled. The standardizing of iron and steel, as touching the varieties in the sizes and shapes of bars, cut down the number of types about one-half; of shafting by more than one-half. Wire rope varieties were trimmed one-third, and the manufacturers find themselves so well satisfied with the change that it will be continued, although, upon the signing of the armistice, immediate steps were taken to cancel all of the agreements entered into with the manufacturers of and dealers in all of these products.

The problem of equipment is one which is rapidly told, and the telling of it makes it sound simple. But as a matter of fact the solution of the problem meant a constant struggle, a daily battle with forces tangible and intangible. The exigencies of the situation forced the Division, through its Priority Section, merely as a sort of side line, to become a business concern of enormous proportions, doing business at the rate of millions of dollars a year. To all intents and purposes the Section was engaged in manufacturing on a large scale, was engaged in the business of producing; it also was engaged in the business of buying and selling; its warehouses were in every city. This great business concern, morever, had to operate under unusually difficult circumstances. It "sold" only under given conditions. It could "buy" only under given conditions. The success of this enterprise was vital to the success of the entire spruce and fir program, and the manner in which the work was carried forward is by no means least of the achievements of the officers of the Division.

Perhaps a few comparisons will serve to show in a graphic manner the accomplishment of the Priority Section. If the eighteen millon feet, or thirty-four hundred miles, of wire rope which were supplied could be welded into a single cable, such a cable could be tied round the Yeon building in Portland, carried south, slipped through the Golden Gate, and thence put across the Pacific to Honolulu harbor, leaving fifteen miles at each end for making

fast. If the 400 donkey engines could be fabricated into a composite engine, developing the aggregate horse-power of them all, this engine, set down in San Francisco, would be capable of hauling an average sky-scraper from Broadway, New York, across the continent, by the use of the wire rope mentioned. If the 68,000 dozen axe-handles supplied by the Section, were to be placed end to end, they would reach from Portland to Spokane, with enough left over to encircle each city. The water-proofed material supplied for loggers' clothing would lay a path completely across the state of Washington from north to south. And if the 125,000 pairs of loggers' boots could be made into one big boot, and the men who wore them into one big man, such a man with such a boot would be able to kick the Kaiser almost as far, as high, and as handsomely as most of the civilized world thinks he ought to be kicked.



IN THE SMALL TIMBER
Trestle and Plank Road Over Gulch.

CHAPTER V

The Problem of Topography

QUIPMENT and labor problems were, however, not the only ones that harried the lives and brains of Spruce Division officers. These, to be sure, would have been a sufficient guarantee against *ennui,* but nature herself seemed determined to test human ingenuity to the breaking point when man, in his war-making, demanded more than was industrially reasonable. The topography of the country in which spruce grows introduced its own complex problem and made possible the writing of still another chapter of hard grinding endeavor, with something added in the way of human interest that the chapter might not be too dull.

Speaking roughly, the territory in which the Division operated is a parallelogram of some 400 miles in length by fifty in width. "Speaking roughly" is a phrase used advisedly. The spruce family seems to have been an early fugitive from justice. At least its habitat is fixed in the remotest, most inaccessible portions of the whole coast country. That part of the Coast Range which faces the Pacific ocean, is usually spoken of as the "coast slope"; but the man who so named it must have been a sarcastic individual. It is scarred deeply with great canyons and ravines. It is covered with an underbrush impenetrable to man without the use of tools. Numerous—almost innumerable—water courses of all sizes seam the sides of the great hills which rise, often abruptly, from the shore to heights of a thousand, two thousand, and even five thousand feet.

As a scenic panorama, the coast country is magnificent. The solemn grandeur of the towering forests is but a step from the pounding surf of the broad Pacific. The much broken and eroded coast line of the Northwest is a reminder of the "stern and rock-bound shores" of New England. Mountain and gully in such close juxtaposition to the sea makes a happy hunting ground for the camera fiend and the artist. Fish abound in the streams, and game on the hillsides—a paradise for the sportsman. But as a field of logging operations, this same country leaves much to be desired.

It was in a terrain of this character that the Division was set to work. It is a country, moreover, in which the annual rainfall is prodigious, running as high as 135 inches a year, average; and the great portion of this falls between October and June. Various other features added to the general complexity of the situation. First of all, this area was tapped by only six railroads throughout its entire length, and most of the timber lay between and remote from these lines. Secondly, during the two years preceding the United States' entry into the war, British and French agents had been making heavy purchases of this spruce, so that when America began seeking it in quantities, nearly all of the accessible timber had been taken out. Finally there were very little accurate data and few maps extant concerning just where the best and heaviest stands of spruce were located.

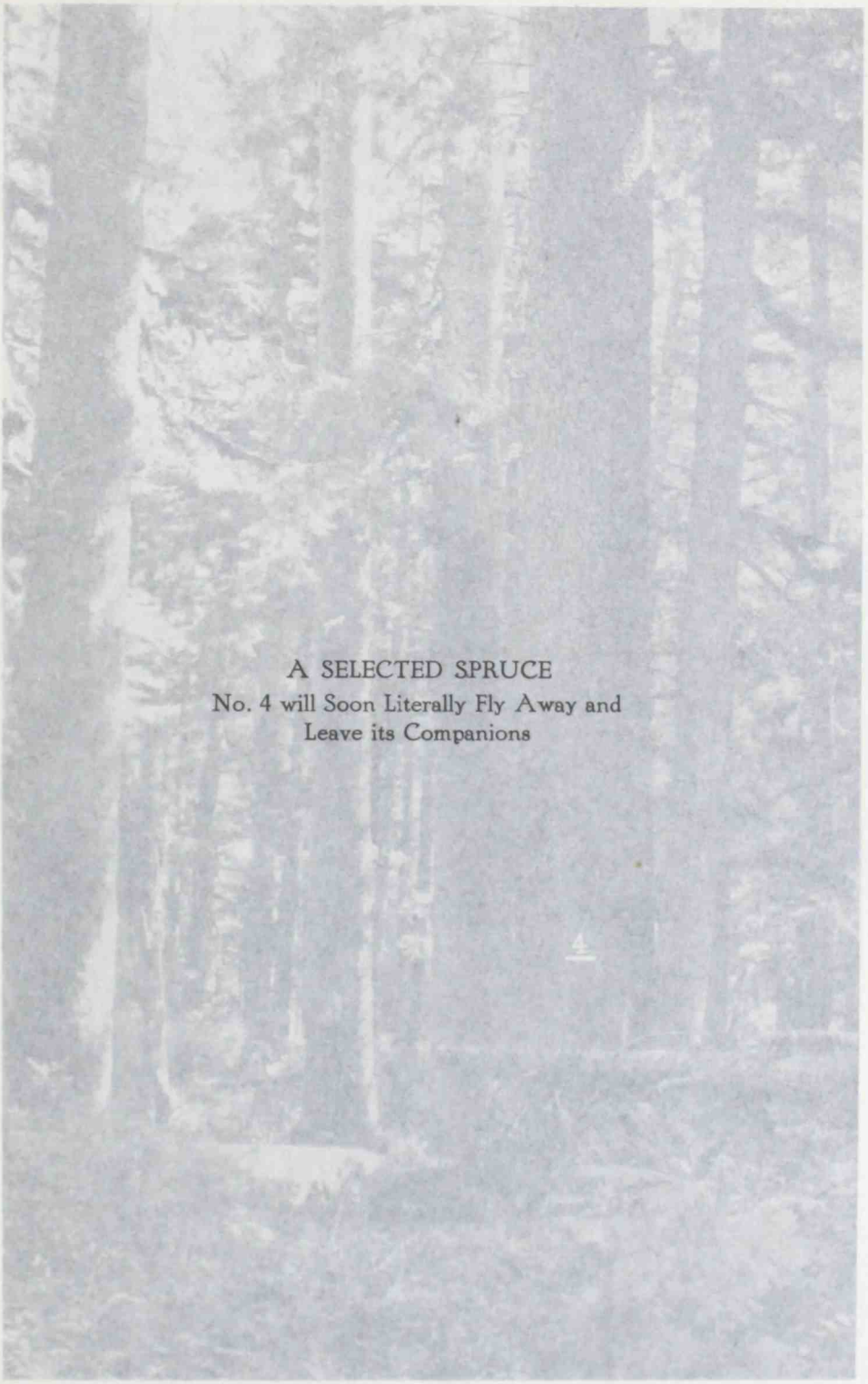
Selective Logging

Here again the nature of the spruce tree was a fresh exasperation. Not only does the Sitka spruce prefer remoteness and inacessibility, but it seems to prefer isolation from its own kind and the company of its fir and hemlock cousins. The heaviest spruce stands will not average more than fifteen or twenty spruce trees to the hundred of the forest. And not by any means is every spruce tree good for airplane lumber. If there is found one good tree to the acre, much better than normal conditions obtain. The general run is one good tree to every three or four acres.

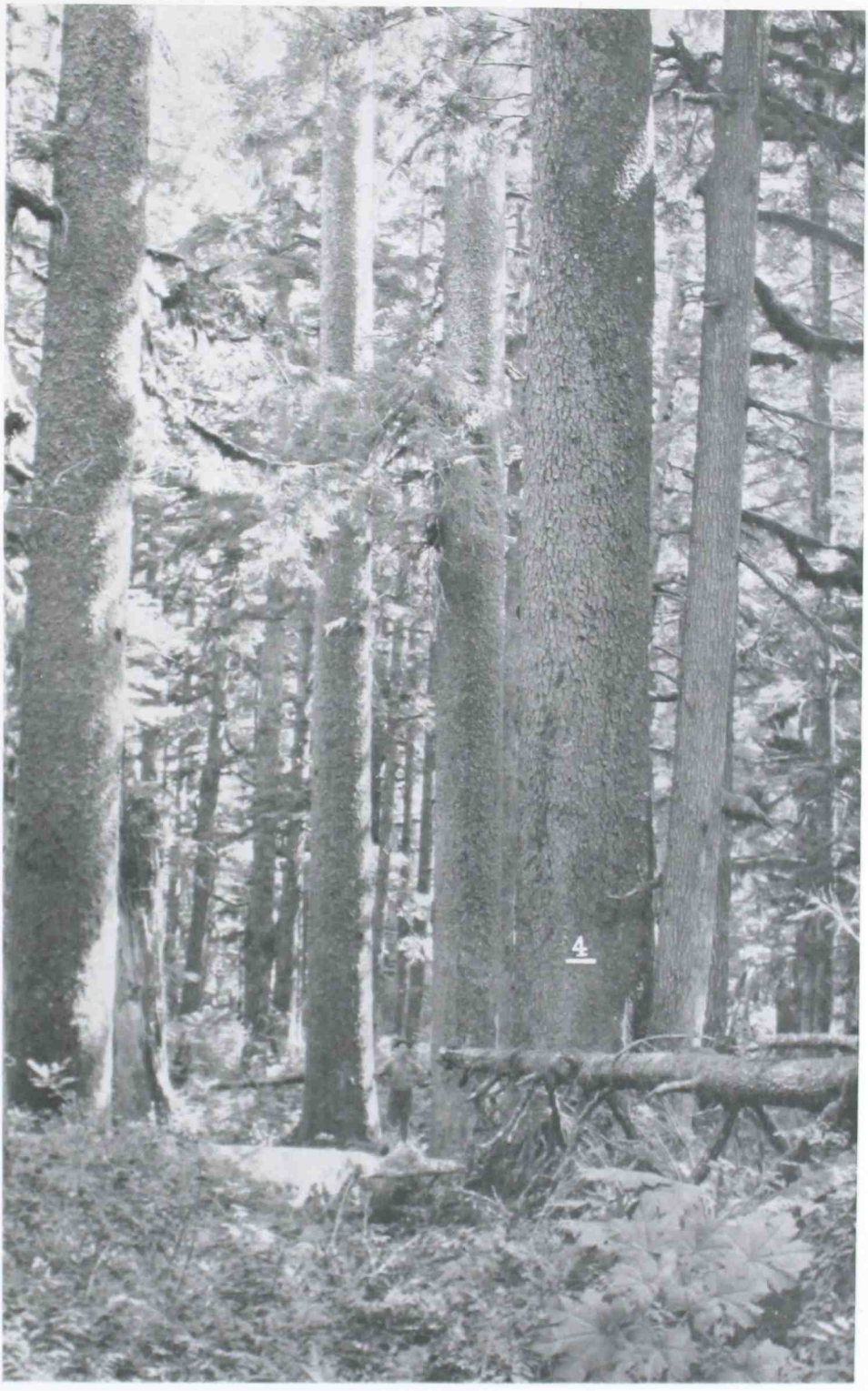
Small wonder that during the early months of the Division's existence the situation seemed desperate, hopeless. Inaccessible timber in territory of such a character cannot be made accessible in a day even with the weight of the United States Government behind the project. It was at once seen that the building of railroads was a necessity; but pending their construction, the Division was faced with an actual production of 3,000,000 feet a month and with a minimum demand for war purposes of over three times that figure. Meantime Foch, Haig and Pershing were to hold back the Hun on the Western Front, depending on Sitka spruce to help keep good the words that Verdun had made historic: "They shall not pass."

General Disque decided at once on the system known as selective logging, and immediately drew down upon his devoted head a shrapnel shower of criticism. The operators of the coast had never done selective logging, which means the taking out of the tree required and letting all others stand. They had always swept the terrain clear of every available tree whether spruce, fir, hemlock or whatever. To reverse this process suddenly was a shattering of practice and tradition that was unthinkable.

A majority of them assured General Disque that it couldn't be done; sometimes cheerfully, sometimes tearfully, but always emphatically. It would be too expensive a process. It would create piles of brush that would start destructive fires. It would be wasteful and slow. But General Disque could not see, nor could anyone show to him, a substitute method that would result



A SELECTED SPRUCE
No. 4 will Soon Literally Fly Away and
Leave its Companions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in as great or greater spruce production. Naturally enough, these operators viewed the matter from the standpoint of profitable commercial logging and milling. General Disque saw it only from the standpoint of a purpose and use for which the war program stood in dire and sore need. The old method would undoubtedly produce quantities of fire and hemlock, but relatively very little spruce. And it was spruce the United States and its associates in the war wanted.

The Momentous Decision

Here was the situation that confronted the Division's leaders. Survey made it apparent that by existing methods of logging, pushed to their very limit, not more than 4,000,000 feet of airplane material a month could be gotten out—and 10,000,000 feet was demanded. Railroad construction was the ultimate answer for the logging program, but something must be done meantime. It was at this juncture that General Disque made a vital decision. It was the decision to split the selected log in the woods, and bring the pieces out on trucks or by team. This one decision saved the airplane program. The carrying out of the plan was expensive. It cost thousands, even hundreds of thousands of dollars. But—and here is the justifying factor—unquestionably it shortened the war. Who dares set a money value over against the value of human lives? Suppose it shortened it by a single month, a week, or even one day. It meant lives and limbs saved, it meant hearts that would not be broken, it meant widows and orphans that would not be made. And the probabilities are that it shortened it by many months. Was it expensive? It was cheap. Even on a purely material, a purely fiscal basis, it was cheap.

So the cruisers were sent into the woods to mark that one fugitive spruce tree which came up to the airplane standard. That tree was to come out. Its neighbors were to remain. There are at least three good reasons why this plan of selection was not merely advisable, but the only plan worth considering. If it had not been employed, it would have resulted in the taking off of sixteen billion feet of lumber, for which there would have been no immediate use. The hugeness of this figure indicates the physical impossibility of pursuing the ordinary logging system. But even suppose this amount of logs could have been gotten into the water. In that case the industry would have had on its hands 200 per cent. more logs than it was capable of digesting. Third and last, selective logging saved the forests from destruction. Had it not been used, the forests would have been depleted ten to twenty years ahead of their time. Instead of the selective logging process being wasteful, as charged, it was a conservation measure of large proportions.

Likewise the decision to rive was the only port in a very bad storm. To get an ordinary log out of the woods on a truck or by team, in a self-respecting terrain, is one thing. To get out the enormous spruce logs through the dense underbrush, and in a much broken territory is an equine of a very different hue. Riving is a very old means of getting out logs, but these logs had to be reduced to proportions that made it possible to handle them. Yet

the decision to rive provoked another storm of criticism. If selective logging was destructive and wasteful, this was doubly so. When a log is rived the heart is removed and left to decay in the woods. Critics pointed to this waste. They also pointed to the self-evident fact that the trimming of a rived cant would produce still more waste.

These things were all true. But there was another fact that outweighed them; the fact that spruce production was far below the requirement, and the battle front in France wavered precariously until the deficiency should be made up. Riving was essential as a temporary expedient until the spring months came and railroads could be built. It had at least one additional and most important advantage—that of revealing the grain of the logs. As roads were built the riving operations were abandoned, but for the time being the riving system was the means of saving the situation. General Disque induced everyone to rive spruce; not merely the Government operators, but small land owners, farmers, everyone, in short, who possessed so much as one good spruce tree. Special inducements were made, and bonuses paid for delivery to the mills before a given date. The result was that slowly the total production began to mount. In the meantime the great Cut-up Plant was being erected, and the lines of rails began to bore their several ways into the biggest stands of spruce, for a swifter release of the forest giants for their critical task in relation to the battling hosts of Europe.

Riving on Cost-Plus Contracts

Captain (later Lieutenant-Colonel) Reuben Hitchcock, came in January, 1918, and to him was given the charge of the riving operations. To secure the desired rived spruce, cost-plus contracts were entered into with the Warren Spruce company, the Grant-Smith-Porter company, and the Airplane Spruce Lumber company. Immediately upon securing the contracts, the several companies proceeded to vie with each other in attempts to locate and buy up the best stands of spruce. Thus to a considerable extent they managed, at first, to get into one another's way.

It was evident that this fact was hampering the achievement of results, and one of Colonel Hitchcock's first moves was to effect a division of territory between the companies. As a result of this territorial division, the Grays Harbor district fell to the Airplane Spruce and Lumber company; the Warren Spruce concern got the northern half of Pacific county in Washington, and Lincoln county (the Yaquina Bay territory) in Oregon; and the Grant-Smith-Porter company took the remaining half of Pacific county and the counties of Clatsop and Tillamook in Oregon.

One of Colonel Hitchcock's chief sources of grief was inventors. As soon as it became generally known that riving was being done on a large scale, several geniuses came forward with a wide variety of mechanical devices for riving. Some of them were tried out and it was discovered that they would rive the log all right, but any that would do so were too heavy to

take to the log; the log must be brought to them. Of course while it was being brought to the riving device, it might as well be brought to the mill; and the impossibility of bringing it to the mill was the original reason for riving! As a consequence the riving was done with wedges and mauls and perspiration. The Hercules jack proved to be an efficient servant, in finishing the split of the log, after the wedge had made a split wide enough for its insertion. The log was generally split in four nearly equal pieces. Soldier labor did most of this riving—ninety per cent. of it under the cost-plus contracts.

Here must follow the most important paragraphs of this narrative. Their importance cannot be overstressed. They ought to produce a thrill of patriotic enthusiasm, a little quicker beat of the heart, a "three times three and a tiger" for the Army of the Northwestern Front. Listen.

Riving the Hindenburg Line

As a result of the riving operations in mid-winter, the Allied drive in mid-summer was made possible. The material gotten to the Allies in January, February, March and April, as a result of the riving, by July was winging the upper air, wresting from von Hindenburg his highly prized initiative, never to return to his hands. Why? Because the air superiority of the Allies increased and kept on increasing at a pace that threw fear into German hearts where only arrogant confidence had reigned. In November, 1917, air superiority rested with the Hun. At the time of the signing of the armistice, the air score was six Allied planes to one possessed by the Germans.

American daring and pluck made possible such a record. But the daring and the pluck would never have had a chance to exhibit themselves unless the planes had been there, unless they had been there in quantities sufficient to give an overwhelming preponderance. And for that thank the Spruce Production Division, thank the men who were denied the privilege of showing their daring and their pluck, and given opportunity to show instead their grit and perseverance—less thrilling qualities but none the less essential. The Germans called the United States Marines "devil dogs." They called the Scotch Highlanders "the ladies from hell." Had they been fully cognizant of the havoc the log-rivers were to play with their vaunted armies and their impregnable defenses, they undoubtedly would have given the "sprucers" some similar Dantesque appellation.

It is not a little odd to reflect that during the terrible spring months of 1918, when the German hordes victoriously were plunging forward across the fields of France; when the Allied line was writhing and twisting under the terrific impact; when the great cannon of the Hun was hurling its devastating shells upon devoted Paris; when men everywhere were watching and waiting, hoping and praying, confident, yet fearful of the striking of some dread and sinister hour; when civilization trembled in the balance waiting for the knell of its doom to toll; even then, in the dark forests of distant Oregon, far removed from the sound and sight and stench of battle, men

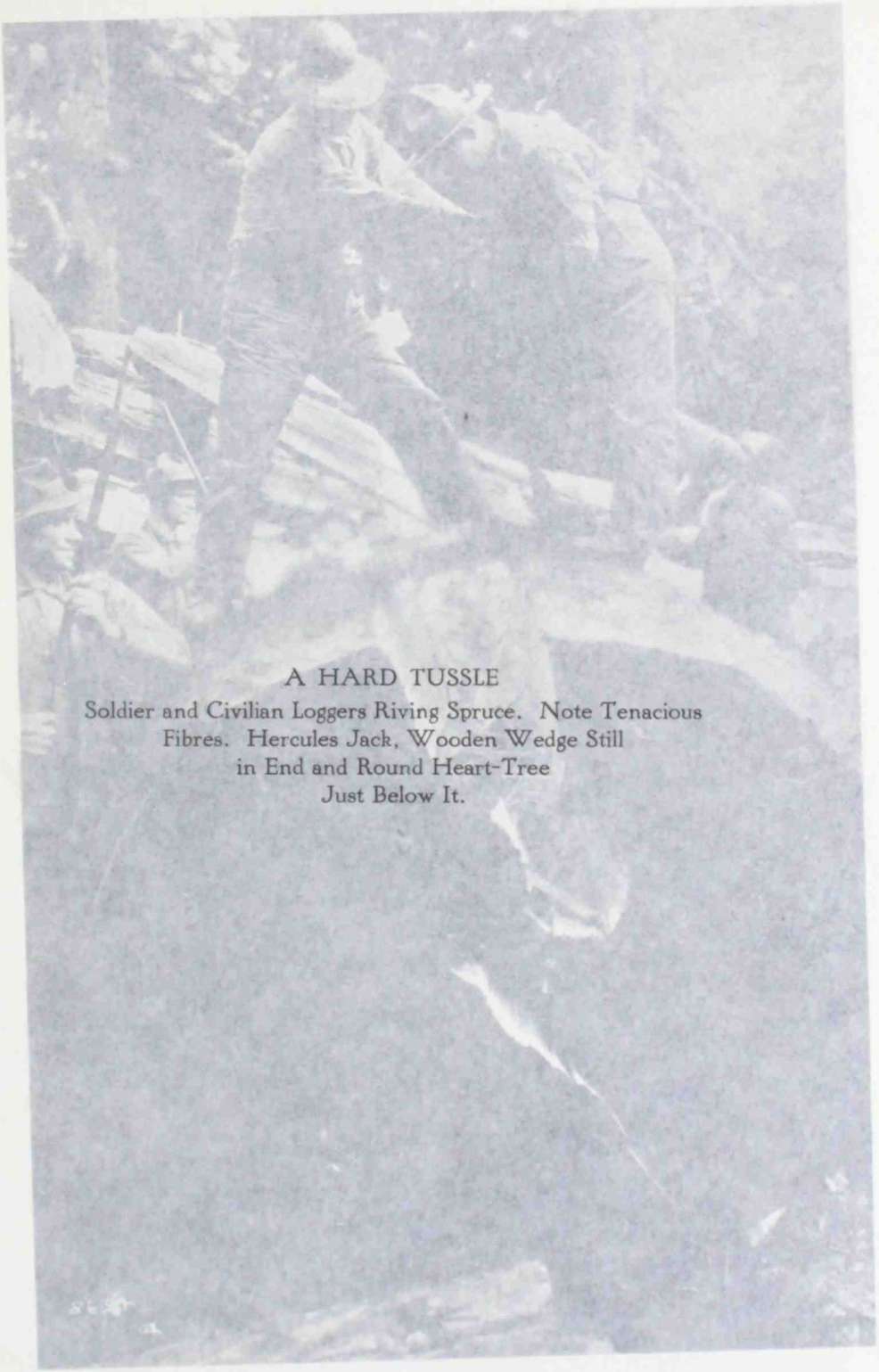
clad in khaki toiled valiantly over a task that seemed to possess little of the flavor of adventure, and nothing of the glamor of war—only the ring of the axe, only the sing of the saw, only the crash of falling timber; even then was being forged the weapon that should beat the hammers of the Teuton Thor to dust, and seal forever the fate of German Kultur, the power-lust of German Junkerdom, and the dynastic ambitions of the House of Hohenzollern.

Important as were the riving operations, however, it was never forgotten that riving was a temporary expedient, and the Division anxiously awaited the time when railroads could be built, and the spruce gotten out in an ever-increasing volume. Along about March 15, 1918, came Lieutenant-Colonel George E. Breece to the aid of the Division, a practical logger and mill man of long experience in the hardwood belts of the South; at first in an advisory capacity, and later to take charge of Lumber Production. The coming of Colonel Breece meant a new era in the Division, particularly in the milling end. He was able to correct some of the errors in sawing, and improve on the methods, and thus gain on the percentage of airplane stock.

The Clallam Operation

The month of May saw the execution of new cost-plus contracts to cover extensive operations in Clallam county, on the Olympic peninsula, in Washington. These were made with the Siems, Carey-H. S. Kerbaugh Corporation, and constituted the Clallam effort as the biggest single Government operation. The district is probably the choicest and most heavily timbered section of spruce, fir, cedar and hemlock left standing in the Northwest, if not in all North America, the selected logging area containing in the neighborhood of five billion feet of standing merchantable timber. The contract called for the delivery of 250,000,000 feet of spruce flitches in eighteen months, and to get it required a program of building 175 miles of railroad, two saw-mills with a joint capacity of 2,000,000 feet each day, and arrangements with six other Puget Sound mills. The woods operations required some twenty camps, operating sixty-five "sides"; the railroads must be provided with facilities to haul out of the woods a maximum output of 500 cars each day; and the entire operation calling for a working force of 6,000 men.

Because of Colonel Breece's sawing reforms, and because the summer season was at hand in which construction was a possibility, Colonel Hitchcock was ordered to let down on the riving operations, and get ready to log. This meant the building of railroads, not only in the Clallam operation, but elsewhere, and several were begun at once. The construction of these roads is one of the big items in the story of the Spruce Production Division. The work was done first under the guiding hand of Colonel Hitchcock, but afterward was put in charge of Major W. A. Welch, Division Engineer. As ultimately outlined, the program called for thirteen roads aggregating 173 miles of main line, and 181 miles of spur. But happily enough, the work of the Allied and United States armies proved so effective that the armistice



A HARD TUSSLE

Soldier and Civilian Loggers Riving Spruce. Note Tenacious Fibres. Hercules Jack, Wooden Wedge Still in End and Round Heart-Tree Just Below It.

bringing peace was signed when less than half of this work was completed. Indeed, the armistice came too soon for the Division to show what it really could do. It scored over 20,000,000 feet of aircraft lumber output in October, 1918. By the following April, it could have been producing at the rate of 50,000,000 feet a month.

Some of these roads were never intended to be anything more than temporary, and were built accordingly, some of the short lines entirely on logs. Piles were frequently used and where these were not practicable, the tracks were laid on stringers supported on log cribbing. This form of construction was both cheap and rapid, as it eliminated most of the work of clearing and grubbing, which not only took time, but cost $10,000 a mile. But four of the roads, on the other hand, were built to be permanent, real "honest-to-goodness" empire builders.

Careful surveys were made before any road was finally decided upon, both as touching its cost and the amount of spruce it would tap. Cruisers' reports and estimates were carefully gone over, and the best spruce areas chosen. Locating engineers were sent in to reconnoiter and estimate the cost of the railroads necessary to reach these areas. A limitation was determined upon, which should govern the decision with reference to each road. This limitation was three dollars (or less) a thousand feet board measure. Whenever it was made clear that a railroad would add no more than this to the cost of the logs, the road was rapidly pushed to completion. Grades were kept to three and seven-tenths per cent., and the curvature to eighteen degrees, except on the very short roads.

The Division's Thirteen Railroads

The first rail venture was made at Pysht in the remote timber districts of Clallam county, Washington. Pysht is located on the Strait of San Juan de Fuca, and the line spoken of runs west from Pysht about parallel with the coast for five miles. The Government's relation to this bit of road was to furnish only the labor, on contract with the Merrill and Ring Logging company, the property to revert to the latter when the Government was finished with it. It is an extension of a logging road owned and operated by the Merrill and Ring concern, and was determined upon because it tapped a body of spruce otherwise inaccessible. The road was finished in May, 1918. All of the roads were known officially by number, this being Division Railroad No. II. But in the office of the Division Engineer, a name was also given each road for purposes of more ready and complete identification.

Division Railroad No. I, known also as the Clallam County Railroad, is one of the permanent steel highways that the Division has left as a lasting memorial of its visit to the Northwest. This road extends thirty-six miles from Hilda, Washington, on the Milwaukee Railroad, a few miles west of Port Angeles, into the heart of the Olympics, running south from Hilda to Lake Crescent, and then turning west to find its terminus on the shores of

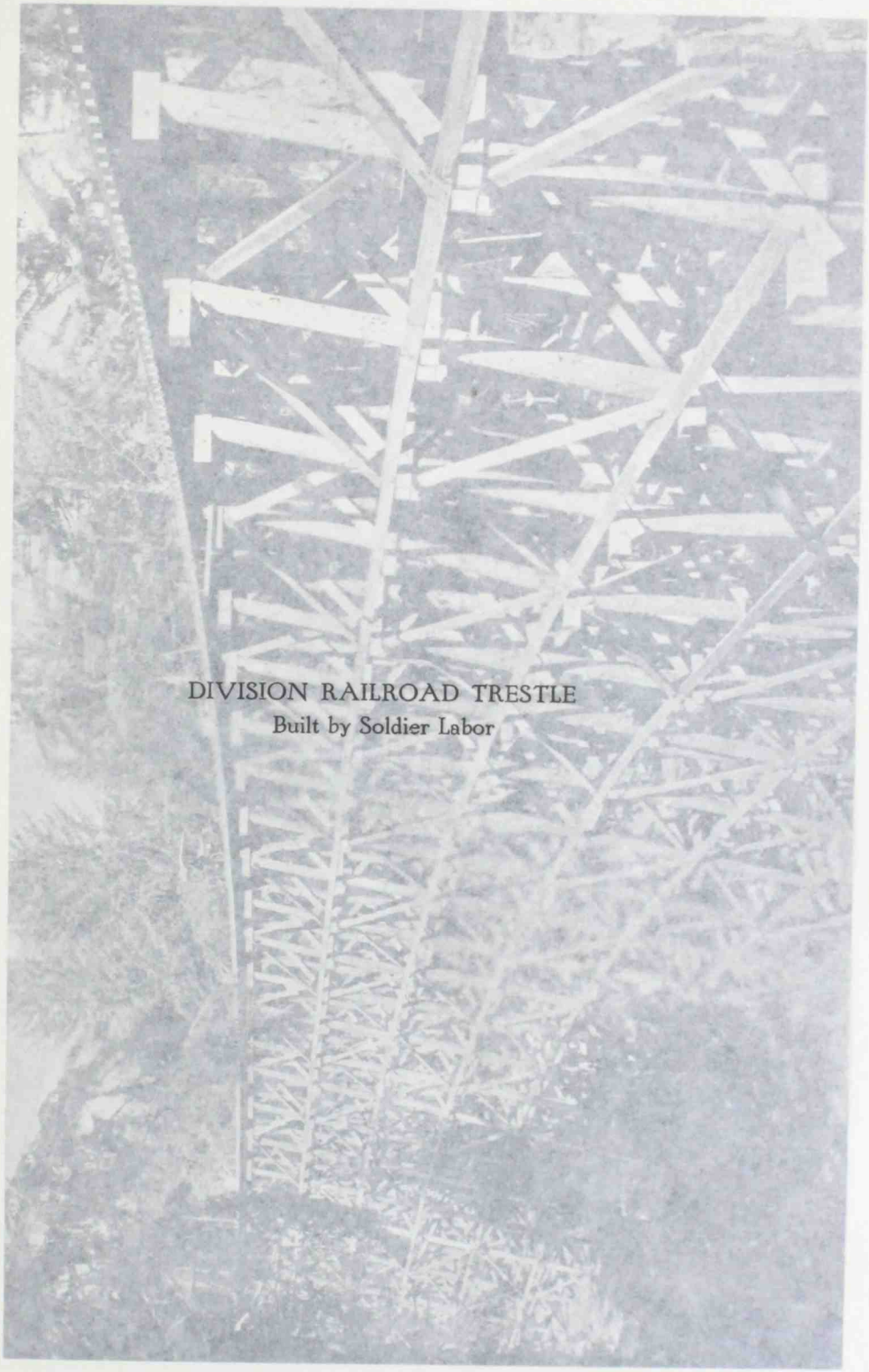
Lake Pleasant in the interior of Clallam county. Construction on this road was begun in July, 1918, and the road was completed in November.

Road No. III is that known as the Quiniault Railroad, in the northern part of Grays Harbor county. Five miles of this were built on a contract with the Polson Logging company, similar to that with the Merrill and Ring company at Pysht. This road was also surveyed four miles into the Quiniault Indian Reservation, and part of the clearing done. It was begun in June, and work on the road was still going forward at the time of the signing of the armistice.

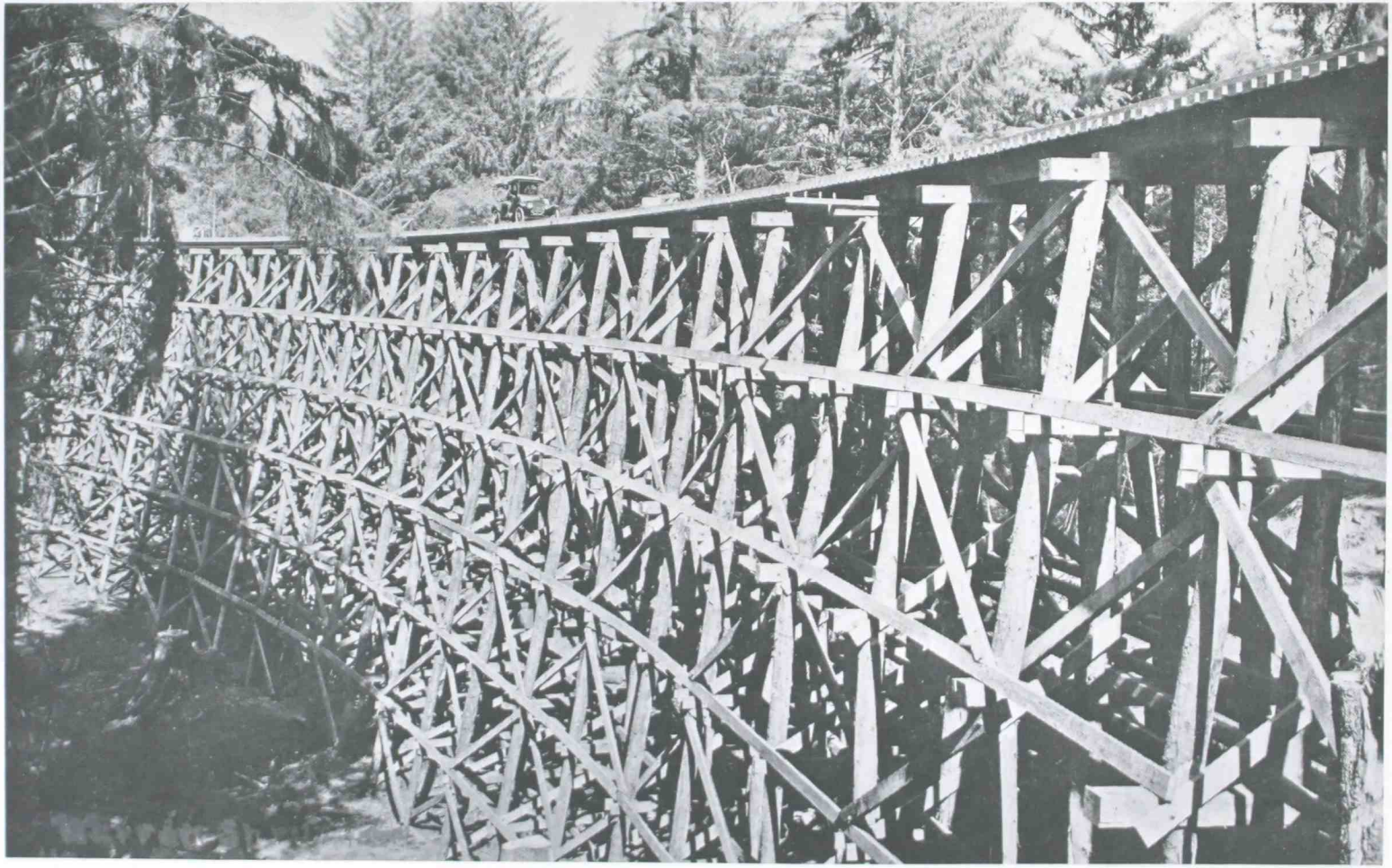
To continue the catalog rapidly: No. IV, the Elk River road, a few miles south of Grays Harbor, was begun in May, and only about two miles were completed when hostilities ceased in November. No. V is the second of the permanent roads, and is called the North Nemah. Its terminus is the town of Nemah on Willapa Bay, and it runs inland along the Nemah River. It consists of eight miles of main line, with a short bit of spur. Work was begun on it in June and still proceeded when halted by the peace of November 11. No. VI, the South Nemah road, also begins at Nemah, and had two miles of main line and one and one-half of spur completed on November 11. The road was begun in August. No. VII, called the Nasel River road, in the southwestern portion of Pacific county, consists of two miles of narrow gauge. It was begun in June, and August saw its completion, after which time it was logged over continuously until the ceasing of operations.

All of these roads are located in the state of Washington, in the narrow strip of land between the Coast Range and the sea. No. VIII road, the Lewis and Clark narrow gauge, was in Clatsop county, Oregon, about two and one-half miles in length, paralleling the Lewis and Clark river. It was laid, logged for a time and pulled up in July, 1918, having done its bit for the cause of spruce production. No. IX, the Lewis and Clark River railroad, also in Clatsop county, consists of thirteen miles of main line with five miles of spur, the terminus being the town of Clatsop, midway between Warrenton and Seaside. It is another of the labor contract roads, and reverts to the Lewis and Clark Railroad company at the expiration of the Government's need. No. X is the Toledo and Wessel Creek, six miles of main line with two miles of spur, begun in May and finished in June. It is in Lincoln county, Oregon, running north from Toledo, the county seat.

Numbers XI and XII are both permanent, fine roads, of lasting benefit to the development of the country in which they lie. Both are in Lincoln county. The first named is the Yaquina Northern, beginning at the town of Yaquina, a terminus of a branch line of the Southern Pacific, and proceeding north along the coast for eleven miles with two miles of spur. The country through which it passes is rich in natural resources, but almost wholly undeveloped. The same may be said of the territory through which No. XII passes. This road begins at South Beach, a point opposite Yaquina on the south shore of Yaquina Bay, and goes south for twenty-four miles. Three



DIVISION RAILROAD TRESTLE
Built by Soldier Labor



miles of spur are graded. It taps the rich Alsea basin and the famous Blodgett tract of spruce, and opens up a country hitherto very difficult to reach. No. XIII, the last of the Division roads, is the Beaver Hill, in Coos county, south of Coos Bay. It was begun in September, and one and one-half miles of rail were laid when operations ceased.

Again the rapidity of our survey makes the task sound easy. Little idea of the intricate problems of every day can be conveyed. There were bridges to be built, not one or two but many of them, owing to the extremely uneven nature of the territory. Some of them were eighty and ninety feet high, combination frame and pile trestles. They must be built speedily, and as cheaply as possible. The delivery of material for some of them constituted a problem by itself. This was especially true of the line running south from Yaquina—that called the Alsea Southern. Here it seemed impossible to find a way of getting in the bridge timbers. Not even a wagon road found its way into this country. There was indeed a sort of wagon trail, but even this was an intermittent affair, and mail was brought through the region by travel along the beach. This was possible only when the tides were right. And the beach was not hard enough to permit the carrying of big timbers even if these could have been trucked in. The solution of the problem was found by a happy inspiration, which came from watching the incoming roll of the eternal tide. The result was the devising of the method of rafting the timbers and towing them out from Yaquina Bay to a point in the ocean opposite the point where they were required, and releasing them on flow tide. The Coast Guards were pressed into service, and followed the rafts in, in surf boats, bringing the lines. When a point was reached that made it possible to carry these in to the men and teams on the beach, this was done, and the rafts made fast. As the tide receded, the timbers lay on the beach within easy reach. They improved the method later, by observing that if the rafts would come in with a line, they would come in without a line. After some experience the men became expert in "spotting" the rafts at just the proper point for release. If, in coming in to the beach, the point calculated upon was missed by more than six hundred yards, it was reckoned that "someone had blundered". Not a raft was ever lost by this method, though on one occasion a raft broke up, and a portion of it was not recovered. It is the first time in history, so far as anyone is able to discover, that the tide has been harnessed and made to do the work of a common carrier.

Ten thousand soldiers worked on the various roads throughout the summer of 1918. A total of 130 miles of road of all sorts was laid, eighty miles being permanent, and all but a small fraction standard gauge. Cruises (made, by the way, chiefly with a view to aero lumber possibilities) show that these roads made accessible over two and one-half billion feet of spruce, over four billion feet of hemlock, four and one-half billion feet of fir, and nearly a billion and a quarter of Port Orford cedar; a total of 12,542,620,000 feet of timber. In the case particularly of the permanent roads, a lasting good has been accomplished in sections reachable hitherto only by teams and

wagons, at best. They will mean much to the future welfare of the regions which they open up.

The roads were built under most adverse circumstances. Lack of ordinary building equipment made the work, hard enough in the sort of country in which the construction was done, doubly hard. They were built "with a pick and a shovel and a sledge hammer." Sixty and eighty pound steel rails were put into place by hand. And in spite of this lack of tools, they must be pushed to swift completion. That so much was accomplished is a creditable performance, both for the engineers who did the planning, and for the soldiers who did the sweating.

The whole significance of the railroads, with the fine strategy of their location, coupled with the location of the Division mills, can be most readily grasped by a study of the accompanying table, which indicates first of all the roads themselves with the construction facts relating to each; next the Division mill which each was expected to feed; then the timber tributary to each, and finally the water-power available in the territory of each.

The table is self-explanatory. But it should be noted that the tract of 13,440 acres described as being tributary to Railroad No. XII is the Blodgett tract which was purchased by the Division; and that in addition to the Port Angeles mill, another mill with two head saws and four cant saws was planned, and the machinery purchased, to be placed at the upper end of Railroad No. I, on Lake Pleasant. There was also a small mill at Lake Pleasant, with one circular head saw.

PROPERTIES OF UNITED STATES SPRUCE PRODUCTION CORPORATION

LOGGING RAILROADS								SAWMILL PROPERTIES			
No.	Miles MAIN LINE		Miles SPURS		Max. Grade %	Max. Curve °	Wt. Rail lbs.	Name	Head Saws	Cant Saws	Condition
	Completed	Graded	Completed	Graded							
1	36.00			70.00	2.0	14°	80 60.7	Port Angeles	2	6	Saw Mill 70% completed. Cut-Up Plant only Piles in.
2	4.69		2.19		3.2	16°	56				
3	5.32		.25		1.4	7°	56	Vancouver	0	12	Complete Cut-Up Plant.
4	2.14		.82		6.0	3°	60				
5	7.73	1.4	.22		3.0	16°	45				
6	2.28	.3	1.62	.50	4.0	15°	45				
7	1.89		.17								
9	13.00	1.5	5.26	1.80	2.2	18°	50 56 60				
10	6.40		1.74		3.0	18°	50 54	Toledo	2	6	Saw Mill 70% Completed Cut-Up Plant Built Ready For Machinery.
11	10.83	1.7	2.09	.75	3.7	16°	60 67.5				
12	23.42	.62		3.36	3.0	16°	60				
13	1.54	2.7	.05		7.0	20°	45 60	Rail connection to Toledo or private owned Mills.			
Total	115.24	8.22	14.41	76.41							

PROPERTIES OF UNITED STATES SPRUCE PRODUCTION CORPORATION

TIMBER TRIBUTARY TO LOGGING RAILROADS

No.	Acres	Spruce		Hemlock		Fir		Cedar		Total Timber		Average Footage Per Acre	Name of River or Stream	Min. H. P. Low Water	Eight Months Min. H. P.
		1000 bd. ft.	%	1000 bd. ft.	%	1000 bd. ft.	%	1000 bd. ft.	%	1000 bd. ft.	%				
Railroad No. 1	257,280	987,309	14.7	2,815,264	41.8	2,393,502	35.5	543,164	8.0	6,737,239	54.1	26,000	Outlet Lake Crescent.	5,000	8,000
Railroad No. 2													Sol Duc	8,500	50,000
													Clearwater	6,000	45,000
Railroad No. 3	40,320	234,065	20.6	397,158	35.0	341,933	30.0	164,196	14.4	1,137,357	9.1	28,000	Queniault	6,000	45,000
Railroad No. 4	29,440	94,518	18.3	123,119	23.8	4,115	.8	295,054	57.1	516,806	4.1	18,000			
Railroad No. 5	30,720	95,570	17.6	138,980	25.4	228,015	42.0	79,712	15.0	542,227	4.4	18,000	Chehalis	16,500	100,000
Railroad No. 6	3,840	30,447	35.8	26,875	31.5			27,897	32.7	85,219	0.7	22,000			
Railroad No. 7	24,320	85,537	28.8	105,208	35.4	30,761	10.4	74,551	25.4	296,057	2.4	12,000	Cowlitz	26,000	150,000
Railroad No. 9	23,680	100,692	20.4	203,243	41.4	187,720	37.8	1,783	.4	493,438	4.0	21,000	Nehalem	3,500	20,000
Railroad No. 10	17,920	82,137	17.8	119		375,318	81.2	5,924	1.0	463,498	3.6	26,000	Siuslaw	5,000	25,000
Railroad No. 11	40,320	604,383	43.5	136,958	10.0	621,419	44.0	31,873	2.5	1,394,633	11.3	34,000	Umpqua	13,500	800,000
Railroad No. 12	13,440	253,765	32.5	200,476	25.5	316,745	40.0	15,116	2.0	786,101	6.3	59,000	Coquille	5,000	90,000
Railroad No. 13													Rogue	200,000	1,200,000
Total	481,280	2,568,423	20.7	4,145,400	33.2	4,499,528	36.1	1,239,270	10.0	12,452,620	100	26,000		295,000	2,533,000

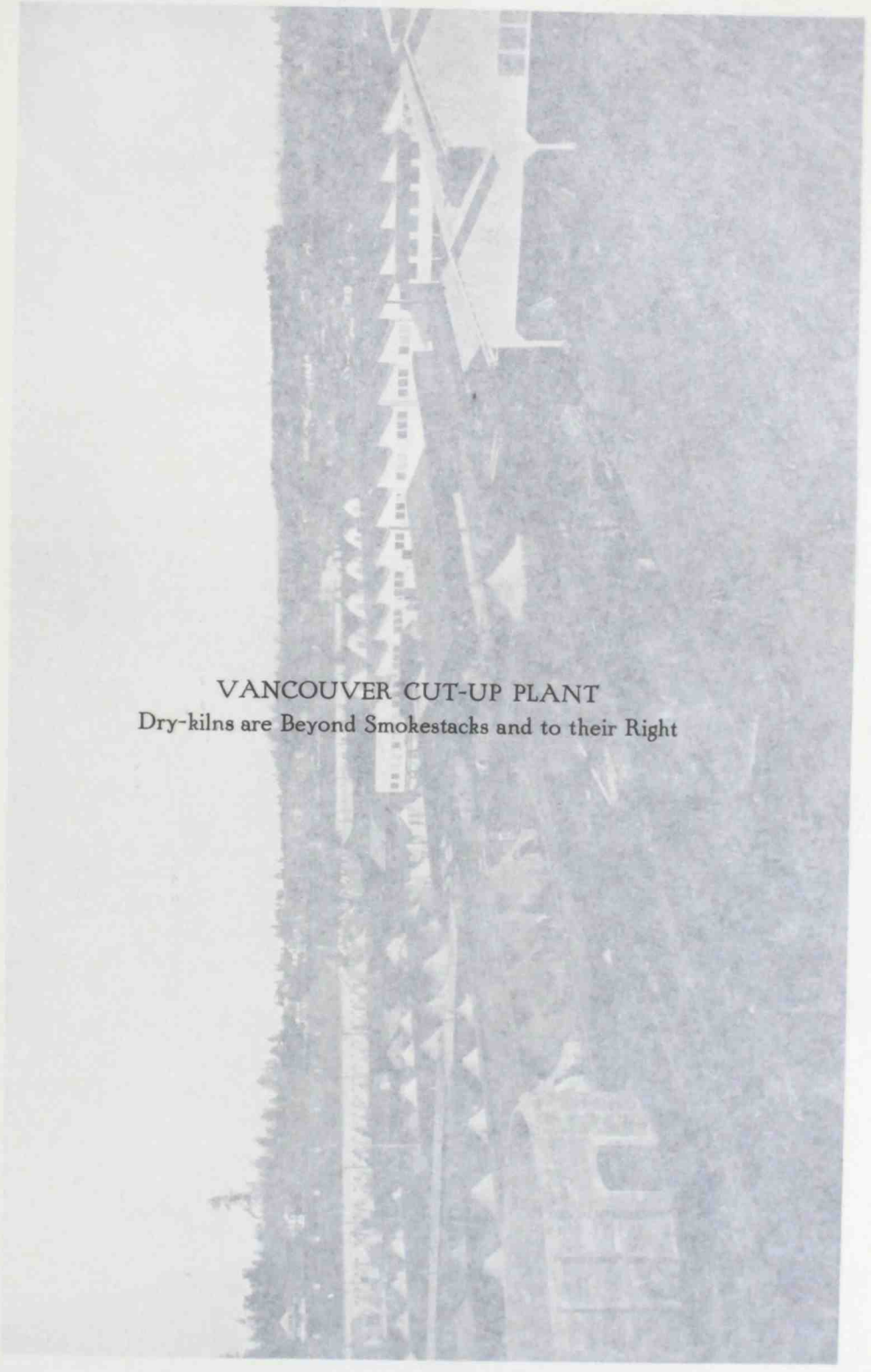
CHAPTER VI

The Straight Grain Problem

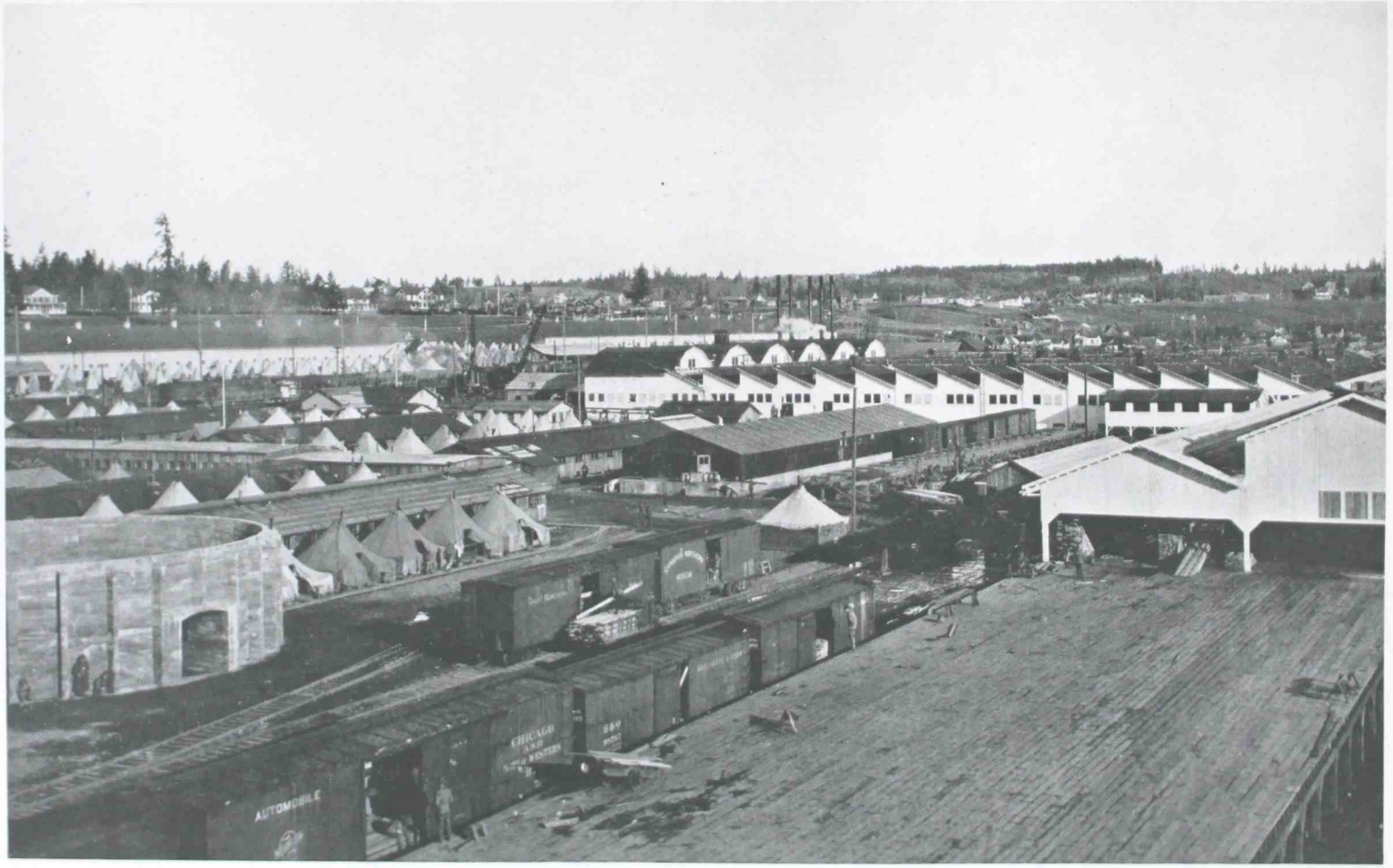
NATURE presented still another complex problem to the Spruce Production Division when she grew the spruce tree with a spiral grain. Most trees grow with a grain that follows the perpendicular of the tree. But it is not always so with the spruce, in which the grain often meanders around the trunk as the stripes circumnavigate a barber pole, though without the latter's regularity.

Why does the grain twist? It doesn't invariably. Some trees are as straight as Sunday school superintendents. No one absolutely knows why the grain twists. General Disque's theory is that the wind turns the trick. Several factors enter in. The spruce trees are older by far than the fir and hemlock trees in their immediate vicinity. Thus for three or four centuries they towered above their comrades. Also as these same comrades shut off the light, the lower limbs of the spruce dropped away. This left a tall tree with branches only at the top, exposed to the full fury of the gale. The theory is that the wind got hold of these branches, and in the course of many, many moons, twisted the trees and produced the spiral grain. This is the more plausible, since the prevailing winds during the growing season on the west coast are practically always from the same direction, and nearly always stiffish, to say the least.

Before the days of the demand for airplane lumber, this idiosyncrasy of the spruce tree had bothered the lumbermen but little. Spruce was cut for clear stock, but without reference to the grain. But wood for airplane wing-beams must be straight-grained. Men sent into the air, on particularly hazardous emprise, must be assured of the strongest wings that nature, with the co-operation of human ingenuity, can provide. The airplane specification is that the grain must not deflect more than one inch in twenty. How could there be produced straight-grained wing-beams, twenty, twenty-two and twenty-four feet long, out of a log that insisted on growing with a spiral grain?



VANCOUVER CUT-UP PLANT
Dry-kilns are Beyond Smokestacks and to their Right


AUTOMOBILE
CHICAGO

"The good Lord made the spruce tree that way, and we can't do anything about it," the operators told General Disque. "The good Lord," he replied, "gave men brains to solve that problem, and we are going to solve it."

Forthwith, the process of solution was put under way. By order, issued December 29, 1917, the Technical Section was created with Captain O. P. M. Goss in charge. During the closing months of 1917, Captain Goss had visited the Dayton-Wright airplane factory at Dayton, Ohio, and the factory of the Curtiss Airplane and Motor Corporation at Buffalo. Investigation at these factories revealed a great deal of lumber waste, and it was quite apparent that the ordinary methods of sawing were not applicable in getting out airplane stock. This made clear the necessity of educational propaganda among the millmen of the Northwest.

The Technique of Sawing Wood

Seven men were selected, three civilians and four officers, all practical lumbermen, and sent into the field, each being assigned to a certain district. Each visited the mills in his territory, explained the difficulties to be overcome, and gave instructions to the mill sawyers as to the treatment of the log to secure the greatest quantity of airplane stock. Careful check was kept at the principal mills of the scale of the logs handled, and of airplane lumber produced. From these records it was easy to determine which mills were most efficient in aircraft production, and a list of manufacturers was compiled for each district. Spruce logs were diverted to these mills whenever possible, to increase the production of wing-beam stock. Each mill was rated according to its respective efficiency.

In the Grays Harbor district there were ten such mills; in the Willapa Harbor district, six; in the Puget Sound district, five; in the Columbia River district, six; in the two Tillamook districts, five; and a like number in the two Coos Bay districts. These thirty-seven mills had an aggregate daily capacity of 4,730,000 feet. It was the business of the field men to keep strict watch on the operations at the specified plants. They saw to it that spruce logs were cut with the least possible delay. They persuaded the management to speed up aircraft production. They took care to see that no aircraft lumber was shipped for other purposes. They kept airplane stock from accumulating at the mills. Blueprints illustrating the proper and improper methods of sawing were prepared and placed in the hands of the operators and sawyers. Demonstrations of the new sawing methods were given. One of the chief changes was in sawing the log parallel to the bark, instead of sawing it parallel to an imaginary plane passed through the center of the log, as is customary. As typical of the result of this work, the coast mills in February, 1918, increased their cut of airplane stock eleven per cent. over that produced in the previous month. Constant study of sawing methods with a view to getting out higher percentages of available material kept improving the technique in the commercial mills.

But the problem could not be solved merely by a process of education. There was not a commercial mill on the coast that was equipped to saw straight-grained spruce in the quantity demanded, and remain in business. To this there could be only one answer. That was to build a plant that would saw in the manner and in the quantity demanded, and at a cost that was at least within reason. Such a mill must be a huge affair, and it must have proper equipment for the work. Once determined upon, the next problem was to get the plant erected. A site was secured, the old polo grounds at Vancouver Barracks being commandeered for the purpose. General Disque called four men into consultation, and after a single day's discussion, selected out of this group the man who was to build the mill. This was Mr. H. S. Mitchell, and Mr. Mitchell immediately laid plans for the accomplishment of his task. From first to last, it may be added, Mr. Mitchell remained in charge of the operation.

Building the Big Cut-up Plant

The labor problem for this plant demanded solution at the outset. The mill must be built without delay, and the construction required a large number of workmen. Where were they to be had? With spruce production at a level far below the demand, the industry could not spare a single workman.

It was at about this time that there arrived at Vancouver Barracks, the first contingent of soldiers promised by the War Department to make up the Spruce Production division. Early in December General Disque went before these men and asked for volunteers to build the mill. He got them, and work was begun about December 14. To this army of American soldiers fell the honor of writing one of the most splendid chapters in the history of America's part in the war. In a way, it was an obscure part. It lacked thrill. It lacked spice and romance. No citations for bravery were made, no *croix de guerre* decorated the breast of any of these men. There was for them no charge at dawn on the enemy front to make good reading in the school histories of future generations. There were no bullets to dodge and no glory to be earned. But there was "dirty work," and plenty of it.

There was the pay question. The men were promised pay proportionate to the work they were doing. But the unwinding of official red tape, like the mills of the gods, "grinds exceeding slow". The pay could not at once be arranged. Did these men stop for an adjudication of the difficulty? Did they form a soviet and pass resolutions? Did they strike pending a favorable settlement? They did not. They were not even disgruntled. They trusted their Government to do the right thing in due time. They threw themselves into their task, compensated by the knowledge that the Government needed the mill, the program of spruce production needed the mill, the Western Front needed the mill, badly and in a hurry; compensated by the knowledge that the Allied world waited expectantly for the stuff that this mill was to provide; and by the dollar a day pay of a soldier. The pay question was secondary to these men. They had come to the Army to perform their share of the

nation's defense. They didn't particularly enjoy the share that had fallen to them; it didn't seem much like licking the Hun. But they stood by.

The pay question was not the most serious. There was the question of their equipment, their clothing. When the realty agents of western Washington are telling the tale, the winters in these regions are as mild and gentle as an old family cob, or a well-broken family Ford, to modernize the simile. But there are certain drawbacks. To be sure, no very low temperatures are registered. There is little snow. But there is rain, and rain is the *bete noir* of the coast winters. Rain, and mud, and slush, and sleet, and the everlasting damp, underfoot and overhead; the everlasting drip, drip, drip, which wears away the spirit, as the constant dropping of water wears away stone. Ultimately one gets used to it, and discovers that, like the North Dakota cold, and Texas heat, this rain is "dry." But this was the initial experience for these men, and to them it still was wet.

They worked in the open in that rain. And in spite of the conditions, or perhaps challenged by them, they stood by without murmuring. They laid on magnificently and triumphed. For they build the great mill, twelve times the size of an ordinary saw-mill, and were able to raise the Stars and Stripes over the first Government-owned plant of its kind, and the biggest plant of its kind in the world, in just forty-five working days.

Supplying the Materials

They worked so fast, indeed, that they very nearly worked themselves out of a job. They worked so fast that they kept the officers who were supplying them with the materials to go into the plant on the *qui vive* all day long, and a good share of the night. The decision in regard to the building of the plant had been followed so quickly by the beginning of the work that scarcely an order had been placed before the building was actually begun. On top of this was the fact that the required materials and machinery were unobtainable for commercial use. Even when a supply could be found, it was remote an unconscionable distance. Most of it had to come from at least as far east as Chicago. It was a pretty race against time and odds.

An agreement secured with the lumber dealers to keep the plant moving guaranteed the material for the external fabric of the institution. As touching the interior equipment, the first expedient available was utilized. Quantities of heavy machinery were shipped in by express. Yet in spite of haste the purchasing was done strictly in accord with Government methods. Every military regulation was complied with in all this buying. The pace set by the workmen was kept, and there was no halting for lack of materials. And all in the face of the emptiest, and most uncertain market in the world; all in the face of the war exigency.

The first saws began to hum on the seventh day of February, 1918, Mrs. Disque, wife of the Commanding Officer, being given the honor of throwing in the switch that started the machinery in motion. Opening day was made a gala occasion. The men who had put across the job in jig-time made holi-

day. There were ceremonies, and the making of speeches, and everyone set in to enjoy the triumph of the hour. Triumph it was; for the Cut-up Plant was one of the great factors in loosening the spruce from its age-old habitat in the woods, and making it soar over Europe to confound the Hun and defend civilization.

Cutting Up at the Cut-up Plant

The plant being completed, the efforts of the Technical Section were at once turned to get the greatest efficiency out of it. This plant did not attempt to handle an entire log, but only the rived cants, or those sawn in the commercial mills. Spiral grain being the chief defect of spruce airplane stock, it was necessary to devise some means of quickly and positively detecting the grain in the sawn cants; in the case of the rived cant, the riving itself reveals the grain. The sawn cant or flitch is without this advantage, though otherwise much more easily handled. It was first thought that a possible method would be to surface the flitch (which is merely a large slab, three to four and one-half inches thick, one to five feet wide, and the full length of the log) on one side, thereby bringing out the medullary ray, a sure index to the grain.

But the cant is an unwieldy piece to put through a surfacing machine, so those in charge began casting about for some superior method. Splitting the piece would certainly determine the grain—so much was well-known. Starting with this as a basis, it also developed that the grain could be detected by picking out a small portion of the fiber on the wide face of the flitch, and this system was installed. A small metal pick was designed by Captain Goss, for this purpose, and a corps of "grain finders" organized and instructed. The grain finders examined every sawn cant coming into the mill, marking lines parallel to the grain in heavy blue pencil. Thus the flitches could be angled on the table, and cuttings made parallel to the blue marks. The process is necessarily slower than ordinary cutting; yet the twelve carriages, originally reckoned to have a capacity of 400,000 feet board measure per day, reached a million a day during the closing days of August, and sustained that pace throughout the entire month of October, 1918, the last full month the mill was operated.

The spiral was not the only grain difficulty encountered in cutting up the sawn cant. Cross grain was also present, especially in the thicker pieces. That is to say, the grain on the lower side of the cant would not be exactly parallel to that on the upper side. If this deviation were slight, a beam cut from the cant would still be within specification. But it might easily be so great as to cause rejection of the beam.

It is not at once apparent just why spiral grain in the tree should produce a cross in the cant. Perhaps it might not, if the spiraling were uniform, but this is far from being the case. The grain sometimes twists first in one direction and then in another. In any case, actual test showed the cross grain, and on the thicker cants the deviation was great enough to ruin the cants as airplane stock. The remedy was reducing the thickness of the cants, which

was done over the protest of some of the mill men, who could not be persuaded, at the outset, as to the facts of cross grain, and wished to send in heavy timbers, twelve and fourteen inches thick.

One of the chief difficulties met with at the Vancouver plant was the getting out of stock for wing-beams, since this had to be long and perfect. A cutting efficiency program was inaugurated to meet the difficulty. A previous study of the manufacture of finished parts was of great service in instructing the sawyers, edgermen and inspectors. Some lumber had been rejected because of minor defects which were of such a nature as to dress out in manufacture. These points were demonstrated, and the mill crews instructed to make special effort to get out long wing-beam stock. The efficiency program was begun on June 24, 1918. At that time the wing-beam material produced was 22.5 per cent. of the total footage of cants cut. A month later this percentage had been raised to a daily average of thirty-five, and in October to forty-three.

In a single sentence, this is the achievement of the Cut-up Plant: in October, 1917, the percentage of airplane stock gotten out of the lumber bought from the commercial mills stood at ten; a year later it stood at sixty for the Cut-up Plant product. This, aside from the great increase of total output it made possible; aside also from the incidental gain involved in cutting down to a large degree, the tonnage moving east to the factories.

Until the signing of the armistice, the operation of the mill continued to be by soldier labor, working twenty-four hours a day in three shifts, six days in the week. About 4,500 men were thus engaged, formed into a military organization known as the Second Provisional Regiment. The men were housed in tents on the grounds belonging to the plant. Lieutenant-Colonel J. D. Reardan was the commanding officer of this regiment until he was relieved in July, 1918, to take charge of the Yaquina Bay military district; his place was taken by Major J. P. Bradner.

Practically, this great plant was the funnel through which flowed the entire spruce supply for the airplane program, not only that of the United States but of the Allies as well. The Allied governments were really the large purchasers of the airplane stock, taking 68.9 per cent. of the entire output. The Cut-up Plant was the source of supply for all of our two dozen or more recognized factories in the East, and so well was inspection cared for at the production end, that spruce waste at the factories was practically nil.

Drying the Wood with Water

After the plant proper was completed, the matter of erecting a battery of dry kilns for seasoning the lumber was taken under advisement, and it was decided to erect them, thus adding a most interesting feature to the operation. When the decision was made, Mr. H. D. Tiemann was called to the coast to consult on their construction and operation, the Tiemann humidity regulated water spray type of kiln having been chosen as the best type for drying aircraft lumber. Details of construction were decided upon by Mr. Tiemann,

Captain Goss, and Mr. M. L. Mueller representing the Washington office of the Signal Corps. The battery consists of twenty-four chambers, fifteen feet in height and an equal distance in width, eighty feet long. The capacity of each chamber is 39,000 board feet of wing-beam stock; that is to say, stock of the dimension of two and five-eighths by four and one-half inches. These spruce wing beams are dried in eighteen days. Beams of Douglas fir, three by four and one-half inches, require twenty-five days.

To determine the effect of kiln drying on the strength and toughness of the wood, it was necessary to establish a testing laboratory. A 30,000 pound capacity Olsen testing machine was loaned by the University of Washington, and the United States Forest Service also loaned testing equipment. To make moisture determinations, two large water-jacketed drying ovens were designed and built. It was thus possible to make accurate comparison of kiln drying with the most carefully air-seasoned wood.

In all tests it was necessary to compute the unit fiber stresses in various pieces of wood. This computation requires considerable time, and on the scale of testing contemplated would have been all but a physical impossibility. To meet the requirement Captain Goss hit upon the plan of making the testing pieces of such dimension that the breaking load, as indicated on the testing machine, when multiplied by ten would give the modulus of rupture for the beam. The fiber stress at elastic limit could be likewise determined. Computation showed that a beam one and one-half inches wide, 1.673 inches thick, tested on a span of twenty-eight inches, would fulfill the necessary conditions.

When a charge of material goes into the kiln, four pieces representing as nearly as possible the material making up the charge, are selected and each cut into two thirty inch pieces. One piece of each is then trimmed to standard size, and tested in its green condition. The remaining four pieces are placed in the kiln with the charge of lumber, until weighings and moisture determinations indicate that the charge is dry. The test pieces are then dressed to standard and tested. It is thus possible to determine just what the effect of the kiln drying has been on the wood.

The details of the drying process indicate the care taken at every step. The material is loaded with a vertical spacing of an inch and a quarter, and a horizontal spacing of three-quarters of an inch. Eight weighing samples are placed in the charge. Steam is turned in and a temperature of 135 degrees Fahrenheit is maintained for eight hours. At the end of this period, cold water is run through the sprays, and excess steam removed. The temperature is reduced to 115 degrees, and the dew point temperature and entering air temperature are regulated to a relative humidity of about ninety percent. From this point on, the temperature is gradually raised and the humidity reduced until, during the last few days, the former reaches 145 degrees, and the latter is decreased to forty-five per cent. Frequent steaming of the material is resorted to in order to prevent case-hardening.

Each day, four of the weighing pieces are removed and weighed, and every third day all eight pieces. From these weighings the rate of drying

is determined. Charts are kept for each charge, and when the weights show an average moisture content of eight and one-half per cent., preliminary case-hardening and moisture-distribution discs are cut to determine the condition of the material. When this is satisfactory the charge is given a final steaming at a temperature of 160 degrees for two hours, and the charge is then withdrawn. By this method moisture content is reduced from thirty-three per cent. to about eight per cent., which means a weight reduction of something between 500 and 600 pounds per M. This again meant considerable saving in the tonnage moving east.

The advantages of the possession of the kilns at the Vancouver plant are manifest. The freight saving alone would have reimbursed the cost in two years' time, had the plant operated for so long a period. But it must not be supposed that the battery was capable of handling the entire output of the Cut-up Plant. For instance, over twenty million feet of aircraft stock was manufactured in this plant during October. Had the kilns started work on this cut at the earliest possible moment—let us say, October 2, 1918—the run could not have been finished until November 26, 1919.

Inspection

At every stage, from tree to dried and finished product, a rigid inspection kept pace. Inspection constituted a problem by itself—many of them in fact. This work was carried on under the direct supervision of the Inspection Department. At first Mr. (later Captain) E. J. Clark had charge of this matter, but later it passed into the hands of Major E. F. Lenihan. Lieutenant Paul E. Terry was detailed to give his personal attention to the scaling and inspection of logs. A staff of sixty-five scalers and inspectors was maintained in the field, with an additional force of civilian assistants in the more remote logging districts. Besides this, two large log scaling and grading companies, one in Washington and one in Oregon, were employed for work in connection with log rafts, and some traveling inspectors kept check on the whole work. All payments to timber owners were based on the work of the Inspection Department. It also approved all manifestos for shipments. It will be seen that this department thus also touched finance and transportation. Inasmuch as the work of the Spruce Production Division had to do not only with log and lumber quantity, but particularly with quality as well, it will be seen that the work of the Inspection Department was of the greatest importance.

Log scaling and grading were the first part of inspection in point of time. Lumber inspection, however, was also a vital part of quality production. Before the United States entered the war, and the Signal Corps took hold of spruce production, the Northwest was furnishing the Allied armies with spruce inspected on a commercial grade of "G list and better". Consignments of this grade furnished a large quantity of lumber which was of no use for airplanes at its destination, and a lot of valuable tonnage thus uselessly employed. With transportation at a high preumium, such wastage had to be eliminated. In July, 1917, Allied representatives, representatives of the

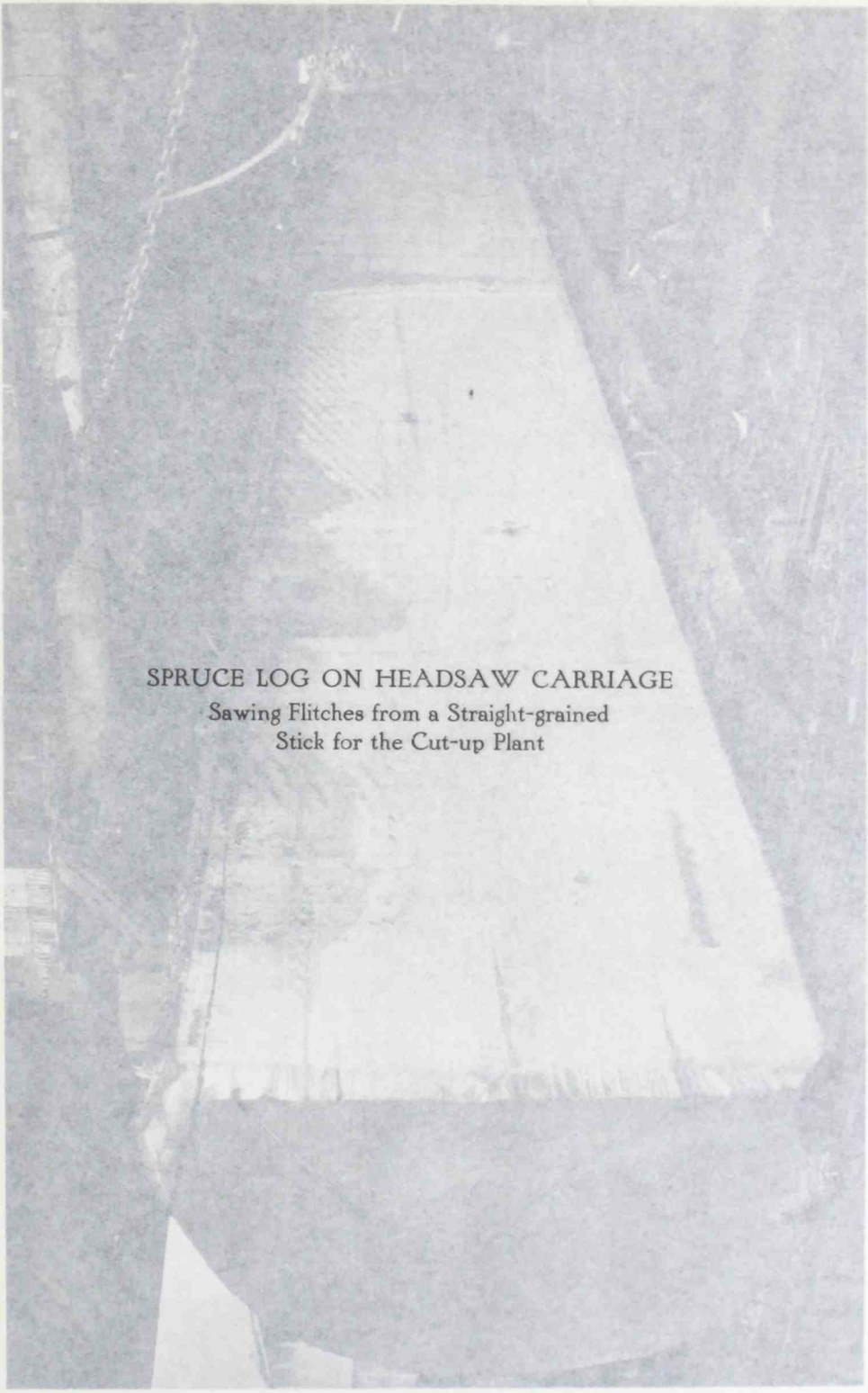
Northwest spruce mills, and representatives of the Aircraft Production Board got together in Washington, D. C., and drafted "Specification No. 1", which governed the acceptance of lumber thereafter.

The introduction of Specification No. 1 resulted in much controversy between mill operators and the Inspection Section of the Spruce Division. Inspection was done through the Pacific Lumber Inspection Bureau, with headquarters at Seattle, because the Allies had employed this Bureau in the past, and their inspectors had had two or three years' experience; besides which it was thoroughly organized, and it was a matter requiring quick action. The education of the inspectors and their conversion to the newer methods was a matter requiring time, but ultimately was accomplished. Anticipating the completion of the Cut-up Plant, a canvass was made of the men at Vancouver Barracks and the various forces in the field for men with lumber experience. These were organized into a school at Vancouver, and received a course of instruction with special reference to airplane stock. The plant was thus furnished upon its completion with a corps of competent inspectors.

Important contributions were made by the Technical Section in the matter of specifications and inspections, in several instances. One of these related to the question of vertical or flat grain. The Washington office of inspection had always specified a vertical or edge grain for sawn spruce cants, and rejected the flat or slash grain. Actual test, however, determined that the flat grain was just as strong as the vertical, and a change in the specifications was secured. This simple change had an important bearing on increasing airplane material. It made possible the launching of a "thin cant" program; that is, a cant sawn from the thin clear outer layer to be found on many logs, and appearing, of course, only as flat grain.

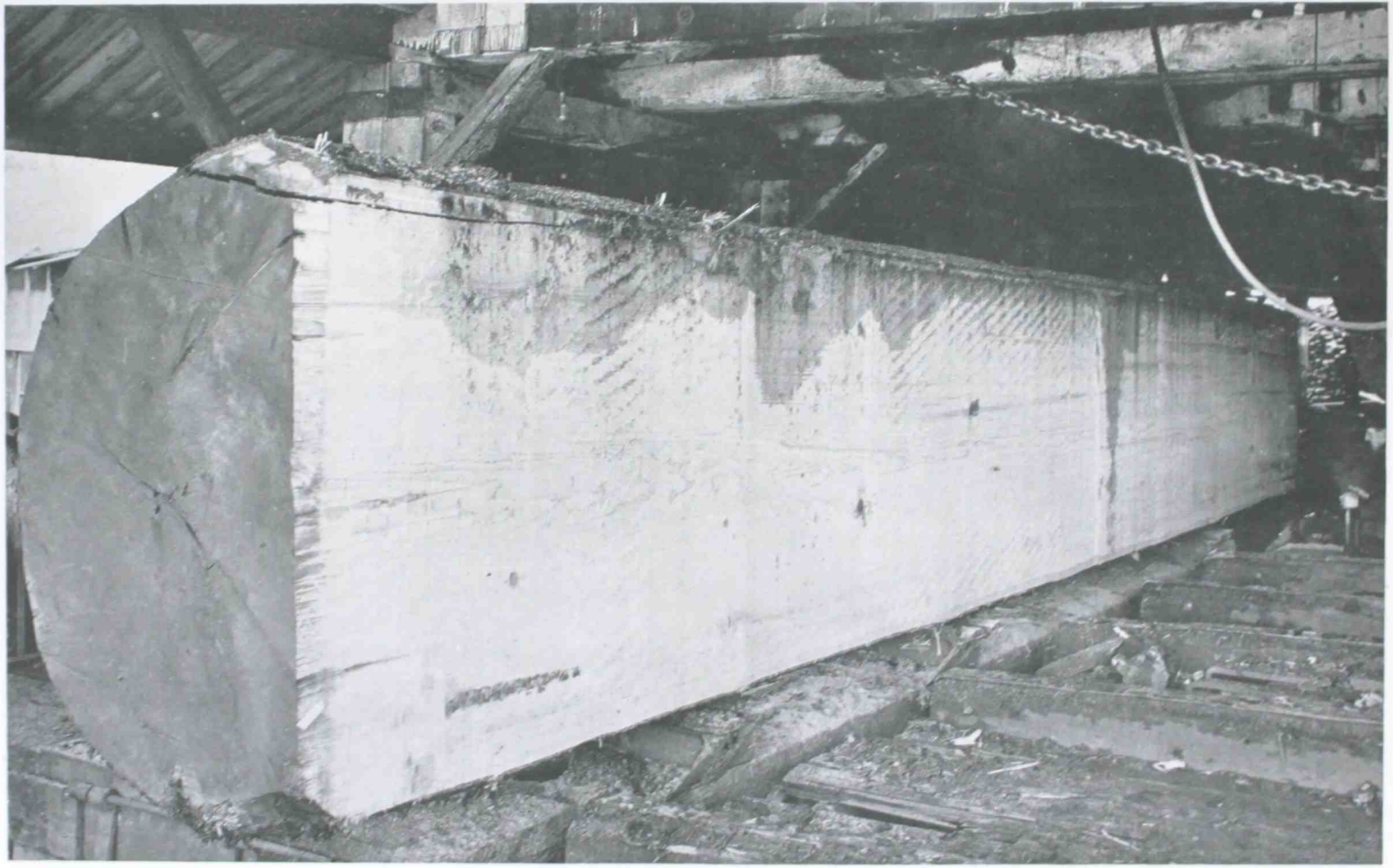
Pitch pockets in Douglas fir had likewise been a frequent cause for rejection. A number of fir pieces were selected and sent to the Forest Products Laboratory at Madison, Wisconsin, for test, to discover the effects of pitch pockets on the finished wing-beam. These tests showed that the pitch pockets were not the serious defects they had been supposed. Sixty pairs of pieces were sent, there being a piece free of pitch pockets to match every one that contained them. Of the latter, forty-seven per cent. failed to show any sign of pitch pockets after being milled down to finished form. Even when the pocket did not mill out, there was practically no loss in strength. This determination, again, materially increased the percentage of airplane stock.

The Technical Section also took charge of the matter of the manufacture of finished airplane parts on the Pacific coast. Eastern manufacturers seriously doubted whether finished parts could be made successfully in the west, and no little difficulty was found in securing orders for western manufactured parts. The doubt was speedily dispelled after the work was started, and the finished beams made on the coast were pronounced excellent and acceptable in every respect.



SPRUCE LOG ON HEADSAW CARRIAGE

Sawing Flitches from a Straight-grained Stick for the Cut-up Plant



Much has been written about the completeness of the statistical work done in connection with the S. O. S. of the American Expeditionary Force, and a few words may not be amiss here about some of the work of this nature carried on in the Spruce Production Division, covering the production and shipments of airplane lumber, cants and logs. Our statistical work in connection with the production and movements of lumber and cants was carried on under the direction of Lieutenant (later Captain) Henry E. Walker, who, as assistant to the Division Accounting Officer, Capt. Conniff, had supervision of the accounting work involved in our milling operations. Statistics in connection with the logging operations were kept by the Logging Department. From records covering the input of logs in the Northwest it was possible to foretell what the production of airplane lumber would probably be sometime in advance, and, if too low, we could promptly take such measures as were possible to relieve the conditions. As for the movements of cants, those coming from independent mills were reported to us as soon as loaded, as were the shipments from Government-operated mills producing cants. This gave a general control of the cant situation, and the completely analyzed cant shipment records, which were based on actual tallies, gave authentic detailed information. Daily reports were compiled at the Government-operated mills, showing the amount and kind of logs sawed, together with the footage of both cants and commercial lumber produced, and the footage of cants and lumber shipped, which gave complete control of our own operations.

Statistical Work

At the Cut-Up Plant in Vancouver, Washington, a most complete statistical system was in operation, and by noon each day a report was laid before the Commanding General, showing just what was accomplished up to the close of work the night before. It told how many feet of rived and sawed spruce, fir and cedar cants were received at the mill, the footage of cants which were sawed and the amount of lumber, both airplane and commercial, produced, together with the footages of both classes of lumber shipped. The lumber produced was analyzed as aeroplane and commercial, and the footage of each grade and kind of aeroplane lumber shown, together with the percentage which the lumber produced represented of the cants sawn.

The value of this system can hardly be overestimated. The causes of any slight fall in footage or percentages could be accurately traced and measures immediately taken to remedy them. When the mill was operating six units, three shifts, and producing a million feet a day, it was possible to trace the fall in percentage or footage to the shift and unit, and if it was due to poor cants, the carload of cants could be determined (as the cants sawed were tallied by carloads and a record was kept of what they produced at the head saw).

Thus the Commanding General and his manager of Lumber Production were able to fix instantly the responsibility for any fluctuation, while under any other method the change would not be detected until too late to remedy and its cause would remain a matter of judgment and opinion. The

causes of the fluctuation in the percentages of lumber produced varied. At first especially, it was due to the newness of the crews and sometimes to the character of cants sawed. By careful study of the causes, and constant work to increase the percentages of aeroplane stock produced, the percentage was increased from 44% in March, 1918, to 62% for October, 1918; and what was more important, the percentage of wing beam stock was increased from 19% in March to 43% in October. This gain in percentage was made simultaneously with a marked increase in volume of production, from 2,057,196 feet in March, 1918, to 28,681,239 feet in October, 1918, and also with a reduction in the cost of production. The reports also served to foster a spirit of rivalry between the crews on each shift and unit, without whose wholehearted devotion to work and co-operation both the increase in percentage and volume of aeroplane lumber could not have been accomplished. This spirit of friendly rivalry was a most important factor, but without an adequate statistical system increases in volume would have probably resulted in losses in the percentage of aeroplane lumber produced, or vice versa.

Shipment records were also kept completely analyzed, showing the movements of aeroplane lumber, both from the Cut-Up Plant and outside mills, to our Allies and to the factories in the east. These were compiled from actual tallies of the shipments and showed both the amounts received by the consignee and shipped by each consignor analyzed by kind and grades of lumber. The shipment records were not always right up to date owing to the delay in receiving tallies from outside points, and were therefore supplemented by daily reports showing merely the number of cars and their distribution, which gave a very good control of the allocation of the shipments and kept the Commanding General in practical touch with the lumber movements.

Many interesting facts are brought out by these records, of which a few of the principal ones are shown here.

The total shipments made by the Spruce Production Division and its successor, The United States Spruce Production Corporation, are given in the following table:

TOTAL SHIPMENTS

	Outside Mills	*Cut-Up Plant*	*Totals*
Sept., 1917	952,663		952,663
Oct., 1917	726,460		726,460
Nov., 1917	2,887,623		2,887,623
Dec., 1917	3,206,981		3,206,981
Jan., 1918	4,595,430		4,595,430
Feb., 1918	7,282,687	37,557	7,320,244
March, 1918	9,344,766	632,626	9,977,392
April, 1918	11,374,894	2,208,271	13,583,165
May, 1918	6,635,581	5,229,141	11,864,722
June, 1918	4,204,272	4,795,862	9,000,134
July, 1918	5,557,131	8,219,120	13,776,251
August, 1918	4,031,300	14,830,206	18,861,506

	Outside Mills	*Cut-Up Plant*	*Totals*
Sept., 1918	2,587,494	14,095,145	16,682,639
October, 1918	2,463,809	19,682,014	22,145,823
Nov. (to Nov. 11).	504,441	6,923,487	7,427,928
Totals	66,355,532	76,653,429	143,008,961

The above is segregated as to kinds of lumber in the following table:

	Outside Mills	*Cut-Up Plant*	*Totals*
Spruce	43 481,976	35,884,532	79,366,508
Fir	22,501,271	37,405,413	59,906,684
Cedar	372,285	3,363,484	3,735,769
Totals	66,355,532	76,653,429	143,008,961

Its distribution to the Allies and the United States was as follows:

British	41,437,047 feet
French	34,595,701 "
Italian	14,630,894 "
United States	52,345,319 "
	143,008,961 "

Allocating the Cut-Up Plant shipments to the states on the basis of the cants furnished by each, and adding to this their direct shipments, gives the aeroplane lumber furnished by the states as follows:

Oregon	53,718,591 feet
Washington	88,471,594 "
Alaska	589,236 "
California	229,540 "
	143,008,961 "

In addition to the above there were 9,414,227 feet shipped by Oregon and Washington from outside mills, which were released by us for shipment but not included in our production or purchases. The shipments increased from 2,887,623 feet in November, 1917, to 22,145,823 feet in October, 1918, or an increase of 666.92%. The shipments of actual wing beam stock increased from a total of 1,454,349 feet in November, 1917, to 14,121,551 feet in October, 1918, or an increase of 870.98%.

This increase in wing beam stock was of even more moment than the cold figures indicate, as only about ten per cent of the stock shipped in November, 1917, was accepted for entering into the process of manufacture of airplane parts, whereas official reports show that in July, 1918, from 85% to 90% was accepted.

This would tend to show that direct government manufacture, and more careful work on the part of outside mills, coupled with closer co-operation with the users, enabled us to furnish the airplane builders with lumber far more suitable for their needs than they received in pre-Division days.

There is one question which a normal American almost invariably asks: How much did it cost? This is not because we are a nation of "money grabbers", Teutonic opinion to the contrary, notwithstanding. It is only that dollars and cents are our accepted standards of index. Whether a thing is worth while or not depends on the price paid for it, and we reckon that price mostly in monetary terms. The question is a fair one.

What did the big Cut-up Plant cost? Undoubtedly it did what it was intended to do, but what price was paid for this result? Many wild figures have been given about the cost of the plant, the more confusing because of a wide variance, a variance that reaches all the way from $250,000 to over $1,000,000. This is probably due to a lack of uniformity in reckoning what should be included. There were some extras erected after the plant proper had been built.

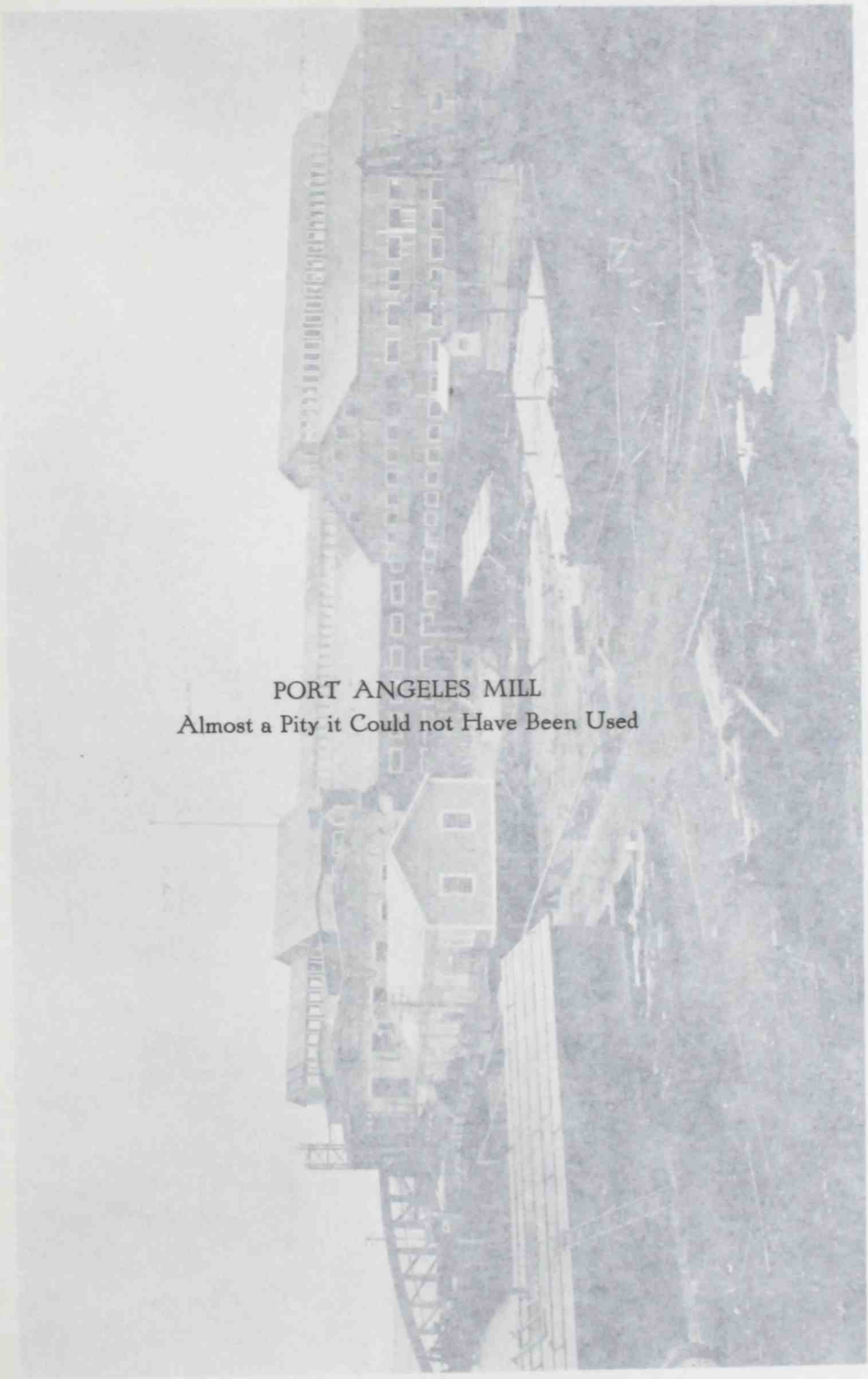
How Much Did It Cost?

Before beginning there is this much to be said about costs. Two ways of judging the cheapness or costliness of the work may be said to be possible. It may be judged wholly as a commercial venture. On this basis one would have to take into strict account the value per M of the product of the plant. Or it may be judged as a winning-the-war measure, and from this point of view, cost makes but little real difference. It places the whole matter on a par with offensive and defensive measures on the battle front. The money cost is a secondary consideration, if the advance toward victory is furthered, or if human life is spared. The Cut-up Plant did both.

Nevertheless, cost was not overlooked. Those in charge saw to it that everything was done at the lowest possible figure, without interfering with the progress and success of the work. As a striking instance of this, stands the erection of the dry-kilns. Experts figured the inside cost of this battery at $275,000, and an appropriation of $300,000 was made accordingly, it being considered wise to allow for excess occasioned by speed of construction. As a matter of fact the kilns were erected for approximately $221,000. And the whole thing was completed in two months less time than the experts declared a possibility.

Approximately $280,000 was the first cost of the Cut-up mill, including machinery. Improvements and additions raised this cost somewhat, so that the final figures were $153,000 for buildings and $192,000 for machinery, a total of $345,000. The receiving yard equipment cost an additional $70,000. One hundred and twenty thousand went into storage buildings, with $28,000 added for their equipment. The machine and blacksmith shops, storehouse and office building with equipment added about $40,000. This makes a total of $603,000 for the plant, exclusive of the dry-kiln battery, or a grand total, all-inclusive, of about $825,000.

Was this cost extraordinarily high, even on a purely commercial basis? Nothing but a little arithmetic will answer the question. Originally it was reckoned that the plant could cut 400,000 feet daily. Its actual performance in October, 1918, was a daily average of approximately 1,000,000 feet, includ-



PORT ANGELES MILL
Almost a Pity it Could not Have Been Used

ing not only aero lumber, but side-cut as well. Starting with this figure and reckoning 305 working days to the year, the annual cut would be 305,000,000 feet. Fifty thousand dollars would pay the yearly interest charge at six per cent. on the $825,000 invested. The added cost per M for interest involved in the investment would therefore be only about sixteen cents. Depreciation is not reckoned in this computation, but even so with aircraft lumber worth well over $100 per thousand, the investment cost is seen to be very low.

As a further guide to determine whether the construction cost of the plant is high or low, one may scrutinize the monthly footage records of shipments of aero lumber. In February, 1918, during which month the plant began to operate, the total shipments amounted to 37,557 feet, all of spruce. The record for the month following is 632,626 feet. In April the plant began to cut fir, and shipped 36,753 feet of that material with a total footage, spruce and fir, of 2,208,271. In May cedar shipments were begun, and 96,404 feet of cedar shipped, with total shipments of spruce, fir, and cedar of 5,229,141 feet. The June total slipped to 4,795,862, but July set a new record of 8,219,120. The August figure was 14,830,206 feet, and that for September 14,095,145. October was the banner month, shipments during this period being over seven and one-half millions of spruce, nearly eleven millions of fir, and over a million of cedar, with a grand total of 19,682,014 feet shipped. In November, the month of the armistice, shipments fell to 6,923,487.

The total shipments of spruce for the ten months' period aggregated 35,884,532 feet; of fir, 37,405,413 feet; and of cedar, 3,363,484 feet, a grand total of 76,653,429. If the value per M of this super-selected stock be reckoned to average $200, (which errs certainly on the side of conservatism) this footage represents a money value of over $15,000,000.00, or about eighteen times the cost of the plant. Had the plant worked on a strictly commercial basis, an added net profit on this material of only ten dollars a thousand, or five per cent. of the selling price, would have almost paid back the investment, without taking into account the millions of feet of side-cut product.

It should be understood that these figures apply only to the Cut-up Plant. They do not represent the total output of airplane material from the Northwest woods. In order to arrive at that figure there must be added the shipments from outside mills, which, during the total period, (from August, 1917, to November, 1918, inclusive) shipped nearly forty million feet of spruce, over twenty-two million feet of fir, and 372,285 feet of cedar; a total aero of 66,355,532 feet, which, added to the Cut-up Plant figures, is a grand total of 143,008,961 feet, which figure represents in terms of footage what the Spruce Production Division did for the Allied cause.

The daily production of lumber at the Cut-up Plant at the time of the halt of operations is the equivalent of sawing up a log four feet in diameter and three miles long. Such a log laid down in Broadway, New York, would reach from the Battery to 42nd street. Placed in a solid pile thirteen feet square, it would make a stack over 700 feet high—higher than the Woolworth building. The airplane lumber sawed into wing-beams, would reach,

if laid end to end, 166 miles, or almost the whole distance from New York to Boston; and in six months the mill would saw enough to reach around the world. Each of the twelve head saw carriages in the mill averaged three round trips for every piece of lumber turned out; consequently they traveled 500 miles a day, and over twenty-six miles an hour, which rate of speed would take them from New York to San Francisco in six days, if the travel were combined in one direction. The completion of the Toledo and Port Angeles mills, with their cut-up plants in connection, would have enabled the Division to double these figures.

Then the query rises: Why such enormous preparations; what is the reason for so vast a production? The answer is: To secure, beyond all peradventure, the supremacy of the air. The life of a plane is a brief one for two reasons. The first is the hazard of the game itself. The second lies in the fact that the air program was developing so rapidly, and with so many changes, that with the best of luck, a brand new plane was apt to be out-of-date inside of thirty days. And, if out-of-date, then suicidal to use.

Other Government Mills

But the Cut-up Plant at Vancouver was not the only mill owned by the Corporation at the close of hostilities. It was, indeed, only a fraction of the total saw-mill property. In July, 1918, a big saw-mill was begun at Toledo, Oregon, and a twin mill at Port Angeles, Washington. These were to care for the two major operations, the one in the Yaquina Bay territory, Lincoln county, Oregon, and the other in Clallam county, Washington. They were to rank among the largest mills in the world, having each a capacity of a million feet a day. The equipment of each was two (band) head saws; and as an auxiliary to each there was planned a cut-up plant of six head saws. The completed cost was reckoned at about three-quarters of a million each. These two sawmills were seventy per cent. complete on Armistice Day. At Toledo the cut-up auxiliary was ready for the installation of machinery, but in the northern mill, work on the auxiliary had just commenced.

A third mill was among the late purchases of the Corporation, and was to have been erected at Lake Pleasant, in Clallam county, at the western terminius of Division Railroad No. I. This mill when purchased stood in British Columbia, and was being dismantled for shipment when the armistice was signed. Instead of going to Lake Pleasant to be re-erected, the shipment was diverted to Vancouver, Washington, for storage. This mill would have been as large as either of the other two, except that in the cut-up auxiliary there would have been only four cant saws. The machinery was purchased for $295,000. The Corporation in addition, owned a small mill with one circular head saw at Lake Pleasant.

Cut-up equipment for sawing straight-grained spruce from cants and flitches was also installed in the St. Paul and Tacoma mill at Tacoma. It was the expectation to do the same in about a dozen other commercial mills at the time the Hun morale cracked and peace put an end to war measures.

CHAPTER VII

The Traffic Problem

FALSTAFF'S FORTUNE, in a histrionic creation of the late Bard of Avon, entitled *The Merry Wives of Windsor,* was continually to be wafted gently out of the frying pan into the fire. Though the comparison ought not to be pressed too far, since it was Falstaff's irrepressible buffoonery that led to his many mishaps, yet the Spruce Production Division seemed to share Falstaff's fate. When the finished product from the Cut-up Plant had finally been loaded on the cars, it might reasonably be supposed that the troubles and trials of the Division were at an end, at least with reference to that particular lot of lumber. Up to this point the problems pyramided themselves very much like the nursery rhyme concerning the edifice erected by Jack, if the swift descent from Shakespere to Mother Goose can be pardoned. We might recapitulate them in this fashion:

To get out the spruce from the forest.

To furnish the labor to get out the spruce from the forest.

To send in the materials to equip the labor to get out the spruce from the forest.

To build the railroads to send in the materials to equip the labor, and to get out the spruce from the forest.

To erect the plant to cut up the timber brought in by the railroads, logged with the equipment in the hands of the labor, at work on the spruce in the forest.

To inspect the lumber cut up by the plant—

But why go further? Only because the placing of the product of the Cut-up Plant on the cars by no means finished the task of the Division with relation to that lumber. It merely brought it to a spot where a new element of the problematical was introduced. How should the lumber reach the factory? Well, of course there are railroads, and there is rolling stock. "Boy, call up the freight agent and order a thousand empties for immediate delivery." What could be simpler than that? But the simplicity ends right there. When

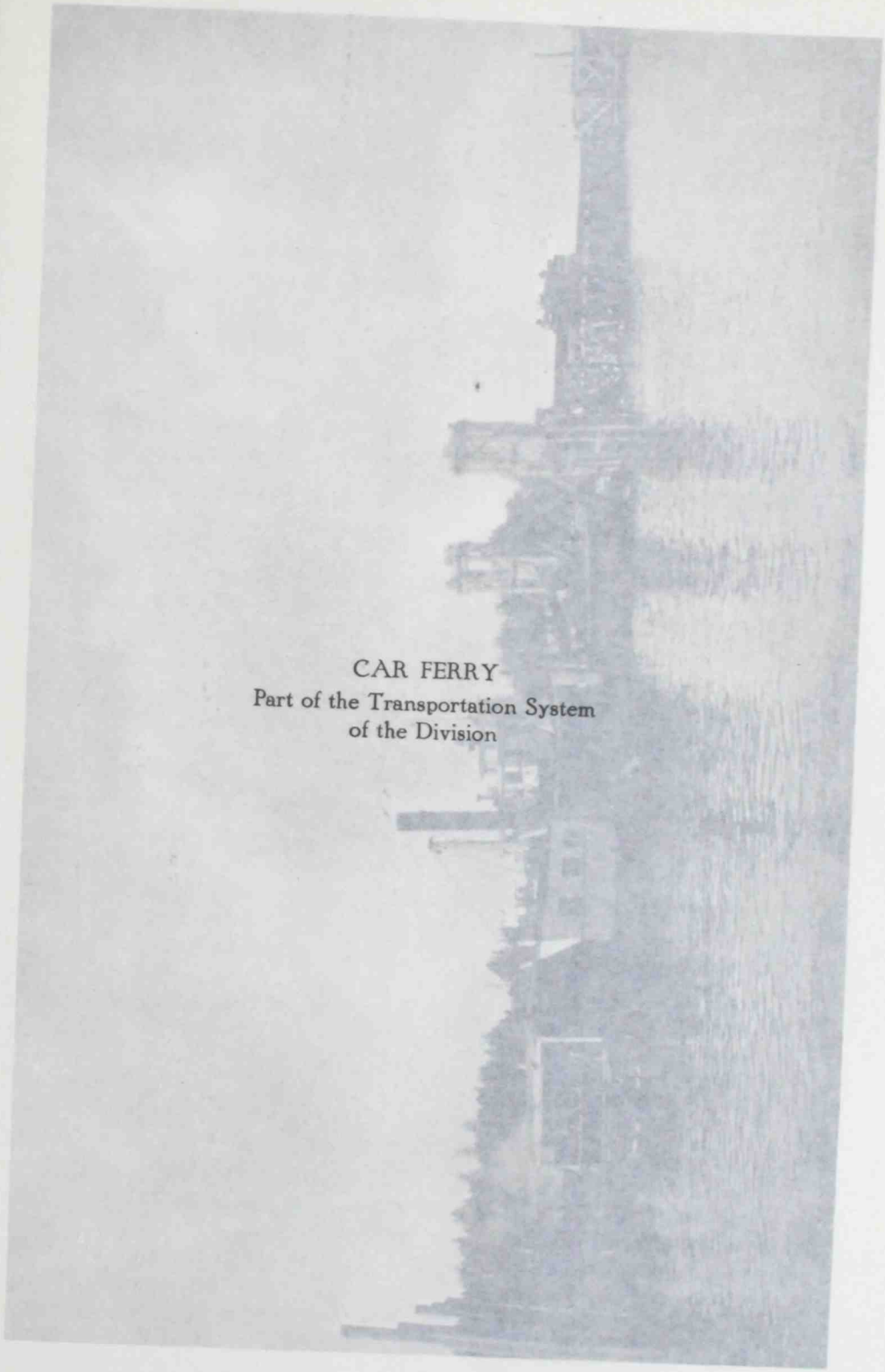
the Traffic Section of the Spruce Production Division attacked its particular problem, they found simplicity among those "absent without leave". It was one of the earliest sections formed, coming into being on October 24, 1917, in charge of Major George Powell. Since that time its woes have been both numerous and trying.

The first question that confronted the Section was that of uniform shipping instructions to cover the movements of aircraft lumber to the various factories in the country, and to the port agents representing the Allied governments. Prior to this time all shipments had been billed to the United States Signal Corps at Chicago, for diversion to consignees having the greatest need of material. This plan had resulted in confusion and delay, and in much congestion at the Chicago terminal.

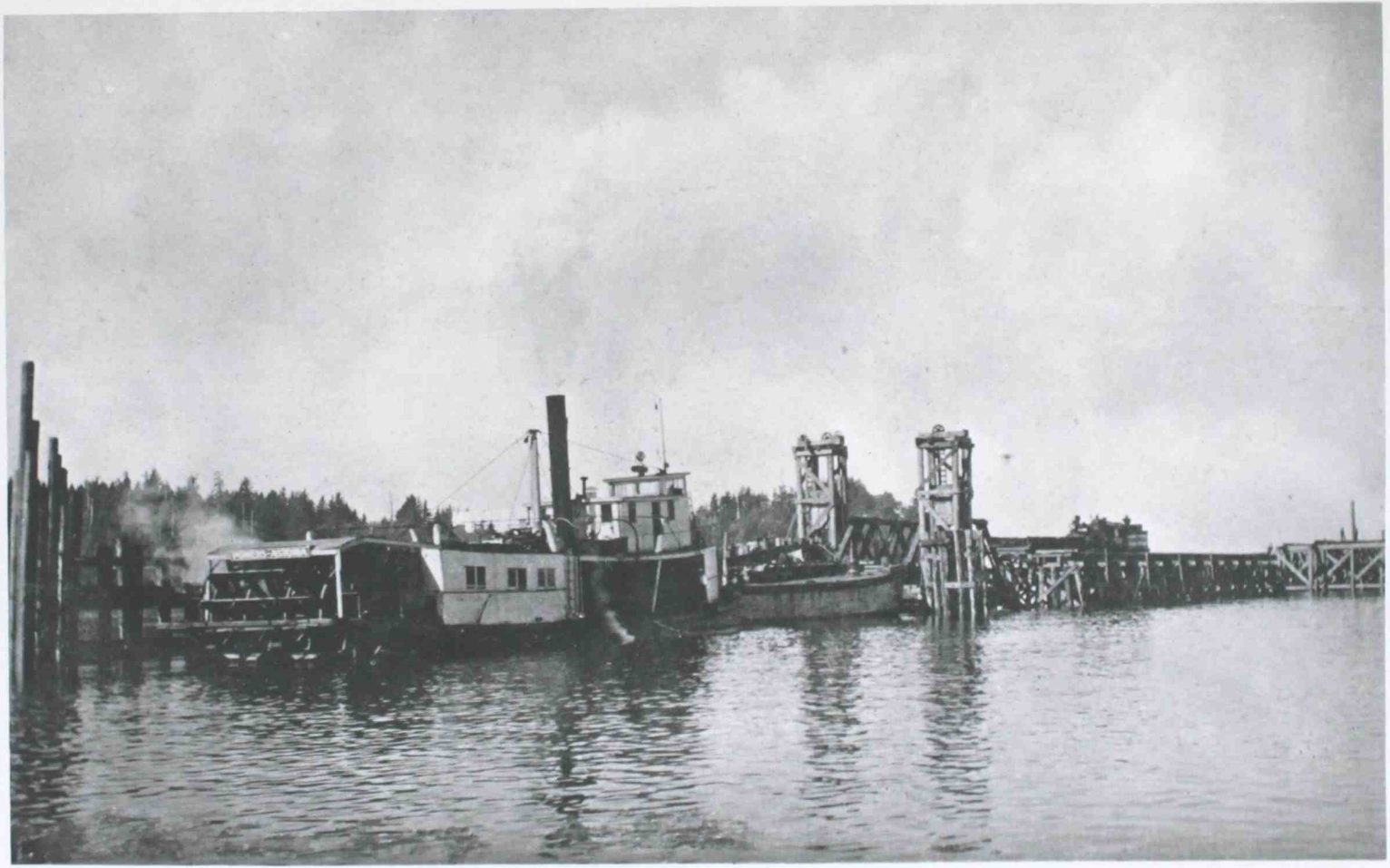
Shipping Instructions and Car Program

Several plans to take the place of this one were tried out and abandoned, as it became apparent that they were unsuccessful, or the needs and requirements underwent change. A plan of tracing shipments to expedite their movement was also worked out with the Traffic Branch of the United States Signal Corps at Washington, whereby the Section secured daily passings on cars to the St. Louis and Chicago gateways. In December, 1917, arrangements were made with the Fir Production Boards at Seattle and Portland for handling all traffic matters pertaining to the movement of fir aircraft material, and shipping instructions were amended accordingly.

By February, 1918, the volume of business had risen enormously, and the tracing of individual shipments became so burdensome as to necessitate further change. This was brought about through arrangements perfected by co-operation with the Fir Production Board of the United States Emergency Fleet Corporation, and with officials of the Chicago, Milwaukee & St. Paul, the Great Northern, the Northern Pacific, the Spokane, Portland & Seattle, the Oregon-Washington Railway and Navigation, and the Southern Pacific railway lines. Under these arrangements it was agreed to handle all Government lumber in special trains; and that the traffic manager of the Fir Production Board at Seattle should have charge of all such trains moving via the northern lines, while the traffic officer of the Division, in conjunction with the traffic manager of the Fir Production Board at Portland, should have charge of those moving over the southern lines. The importance of this change in expediting shipments and increasing total tonnage is obvious, and the plan worked very successfully. The transit time to the east had been from forty-five to ninety days. This was very materially reduced. The time to Chicago was cut to an average of eight and one-half days; that to Buffalo and to Galveston, to an average of eleven days; and that to New England points to eighteen days. There was an occasion in April, 1918, when the efficiency of the Traffic Section (and indeed of the entire Spruce organization) was put to a severe test. The English government ordered 1,000,000 feet of spruce for delivery at an Atlantic port in twenty days; spruce that was wanted



CAR FERRY
Part of the Transportation System
of the Division



for immediate use. It was an S. O. S. from Sir Douglas Haig. Under the old conditions the filling of such an order would have been an impossibility. The wood had to be taken from the forests. But the Division went into an accelerando, and got the material on the cars in just under ten days. Here the Traffic Section took hold, got a special train, shot it across the country on special orders, without a hitch, without so much as a hot-box; and it arrived at the specified port eight days and nine hours later—a total of eighteen days from the Oregon hills to the eastern coast, two days under the limit.

During the first four months of the operation of the solid train plan, the section handled 114 trains on all lines, with a total of 1,670 cars. Ultimately all, or practically all, of the Government's requirements were shipped in this way, the shipments including not only aircraft material, but ship timbers and other lumber for Government use.

But before the system had gotten well under way, a new shadow fell across the path of the Traffic Section, by reason of it being swamped with diversion orders from the Equipment Division of the Material and Sales Section of the Signal Corps at Washington. The numerous diversion orders promptly produced just complaint from the railroad officials, and though the condition was called to the attention of the Washington authorities, no relief was obtained. The Order Section of the Division evolved a new plan of allocation to cover the situation. This satisfied the diversion emergency, but it promptly fell under the ban of the Railway Administration, since it conflicted with orders of the Director General. The Division tumbled into the spume of Scylla while sheering off from Charybdis, so to speak. It seemed as if they had not only the storied whirlpool and rock to contend with, but breakers ahead and a goodly section of the Sargossa Sea behind. But a new plan was evolved to the satisfaction of all parties. This last plan became effective April 29, and enabled the Order Section properly to allocate shipments, to reduce the number of diversions, and to secure co-operation of mills and railroads, although it was sometimes necessary to revise the instructions to comply with the individual needs of some consignee.

The Division traffic officer also came in for criticism from the representatives of the Allied governments, whose shipments of aircraft lumber he was also handling. The same consideration was given these shipments as the domestic shipments received, but it seemed impossible to secure definite instructions from the various foreign ministries of shipping. Eventually, however, this problem was also worked out, and a definite understanding reached, obviating further difficulty.

Still another variety of trouble developed from the damage sustained by the lumber in shipment. During the winter, open cars could be used with impunity; but, with the coming of summer, it was discovered that considerable loss resulted from checking and staining. Instructions were issued that only closed cars should be used where these were obtainable; or, if open cars were employed, then the lumber must be covered on ends, sides and top with one-

inch ship-lap. The result of this instruction was the practical elimination of open cars.

Even more ominous than any of the difficulties recited in the foregoing paragraphs, was the car shortage which developed during the winter of 1917-1918. This not only threatened some of the commercial mills with bankruptcy, but menaced the whole air program. The shortage originated on the Tillamook branch of the Southern Pacific lines in Oregon, and spread rapidly over the remaining lines of that company. The condition was called to the attention of Washington officials and of the Car Service Commission, but no solution was forthcoming.

Car Shortage Makes Long Faces

A long and tedious battle with the car situation ensued. Arrangements were made with the Oregon-Washington Railroad and Navigation company to deliver five open cars every day to the Southern Pacific at Portland. The cars were misused, no relief obtained, and the delivery discontinued November 27, 1917. Southern Pacific officials had made arrangements for the distribution of cars to all mills on their lines, to move a sufficient quantity of commercial lumber to guarantee unhampered production of Government lumber. This proved adequate for a time, but on November 18, the Southern Pacific served notice that owing to continued car shortage, it would be impossible to comply further with the orders of the Division.

They asked, further, for some plan of car distribution fair to all concerned. A program was drawn up and submitted to the Car Service Commission, asking first for a priority order covering aircraft material, all other Government lumber, and commercial cut. It was pointed out that there was no intention to secure cars for the entire commercial cut, but only the minimum amount necessary to insure maximum aircraft production. Secondly, authority was asked to order sufficient equipment from connecting lines to the Southern Pacific to enable the latter to fill car orders. Both authorities were denied despite repeated representations that immediate steps were imperative. Advices from Washington were sent to the effect that mills should arrange to store commercial cut, and ship only Government orders. This was impossible both physically and financially, and would have resulted in bankruptcy for the producers of Government lumber.

On November 28, Mr. William Sproule, president of the Southern Pacific lines, after conference with General Disque, in which the policy of the Division in regard to side-cut was clarified, (Mr. Sproule having been under the impression that it was the intention to move the entire output of the mills in question) issued an order placing the control of car distribution for transporting lumber in the hands of the Division. Under this order, the number of cars for commercial cut was kept as low as possible, and only such moved as was of direct or indirect benefit to the Government. As Mr. Sproule's order was inclusive, the transportation of ship timbers came also under control of the Division, the United States Emergency Fleet Corporation of Seattle approving and co-operating.

By the close of 1917, the car shortage had extended to the northern lines. This caused extension of the program in effect on the Southern Pacific to these lines, after consultation with the mill operators and railroad officials interested. This more inclusive program became effective January 5, 1918. The solution of the problem at this juncture seemed well in hand. Cars were supplied, not only for Government lumber, but for the side-cut it was necessary to move to guarantee maximum aircraft production. Absolute car control was in the hands of the officers of the Division, and also through this control, the production of the mills. The salutary effect was at once seen. Production of Government lumber materially increased, and shipments of "G" and "H" list spruce on broker's orders correspondingly decreased.

But this happy state of affairs was doomed to a speedy end. Although advised of the object and aim of the car program, officials of the northern lines began to pile up opposition, asserting that the program was illegal, and that it made them liable for discrimination claims. This opposition was successful, and an order was received from the War Department, cancelling the car program. The cancellation went into effect February 5, so that the car program built up so laboriously had a life of just one month.

During this period, a priority classification for lumber movements was worked out, with seven classes, giving first place to aircraft material. Then followed ship timbers, other Government lumber, mining timbers, railroad material, orders for Armour & Company for packing meat for the Allied armies, and all other commercial lumber, in the order named. The immense volume of the tonnage is shown by the figures of this month, the total reaching 7,585 cars. Of this number, aircraft material took 275, ship timbers 991, other Government lumber 585, mining timbers 158, railroad material 825, the Armour Company 54; the remainder, 4,597 cars, being taken by commercial lumber.

Clash with Car Service Commission

In March, Mr. J. C. Roth was appointed as the representative of the Car Service Commission in Portland, and car control passed mostly into his hands. About the middle of this month the situation became very grave. Many mills closed, and there was a considerable decrease in Government production. Various meetings and conferences were held, meetings of mill men, meetings of logging operators. Extensive telegraphic correspondence between the West Coast Lumbermen's Association and Director General McAdoo, and between General Disque and the War Department, kept the wires warm. The whole matter was at length forcibly brought up before the Car Service Commission, the Priority Board, the Chief Signal Officer, the General Staff, the Secretary of War, and Director General McAdoo. Detailed information was furnished concerning specific cases of shortage, and of mills closed or about to close. As a result the Priority Board, over Judge Parker's signature, issued an order to the Car Service Commission providing for the movement of both Government and commercial lumber in the ratio of one car to two;

providing further that the responsibility for determining what cars should be furnished, and where and when, should be vested in a committee representing the Government, consisting of General Disque, Mr. J. H. Bloedel and Mr. H. B. Van Duzer. This order was issued April 3, 1918.

Because the shortage was somewhat relieved by mid-April, the Car Service Commission pigeon-holed the order; and after exhausting every known stimulant to get its approval, the Division procured from Judge Parker a new order dated April 17, essentially like the original, but modifying the two-cars-for-one rule, and also stating that the committee referred to would discharge its responsibility through request made by Mr. Roth.

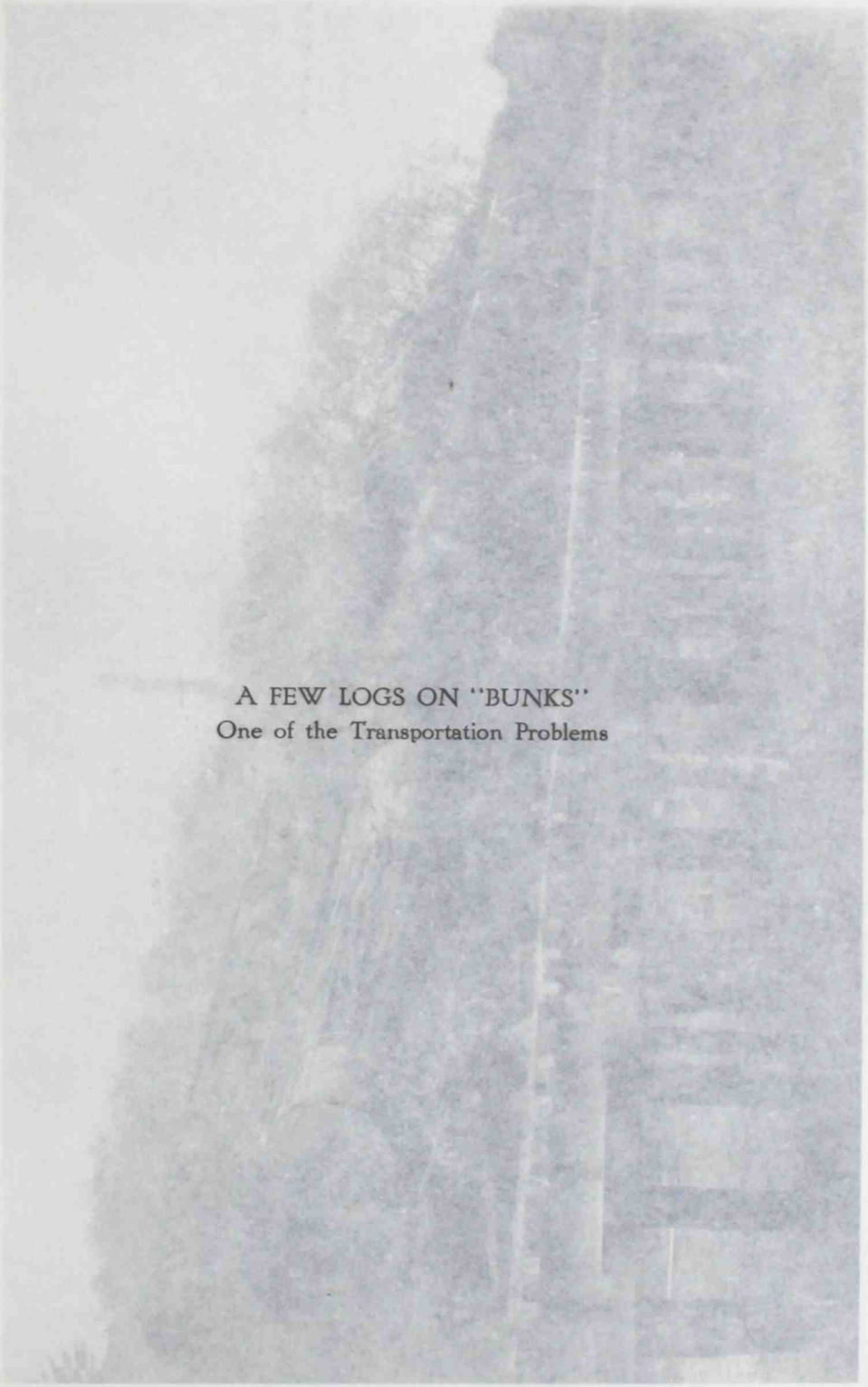
An effort followed to re-establish the embargo power held by the Division from November 28 to February 5, on the Southern Pacific lines, and from January 5 to February 5, on all lines. Eventually this was accomplished through the efforts of General Disque, and on June 13, 1918, the Car Service Commission instructed Mr. Roth to accept orders in writing from the Division and to withhold cars for the purpose of transporting lumber from any designated mill.

Thus ended a long and tiresome struggle. Control of the car situation, and of production, at the mills cutting on Government orders passed into the hands of the Division, with these two orders. By no other means could the continued increase of production be assured. But it required arduous labor to convince the various conflicting authorities, and establish a policy that would meet with the approval of all concerned. It would have been easy for the Traffic Section to have found excuse for failure. It sought instead the establishment of a program that would mean success to the Division.

After Mr. Roth took charge, and largely through his efficiency in handling the situation, the supply of equipment was entirely adequate. During the last seven months of operation (from April 8, approximate date of the end of the car shortage, to November 8, approximate date of the close of hostilities) the number of carloads of lumber shipped from western Washington and Oregon reached a grand total of 139,010, exclusive of rived cants or other forest products. Of this total, 13,564 were aircraft material and sawn cants; 5,591 were ship timbers; other Government lumber took 7,116, and railroad material 11,156; leaving a balance of 101,583 cars of commercial lumber. At the beginning of this period the percentage of Government lumber was ten. The later months show Government shipments averaging twenty-two to thirty per cent. On only four occasions has it been necessary to discontinue furnishing cars to mills for violations of rules of the Division.

Embargoes

During the time in which the car shortage was being fought out, a further grave problem was introduced by reason of embargoes east of St. Louis and Chicago. Congestion on these lines forced the embargo during December, 1917, and January, 1918, and almost the first commodity to get the axe was commercial lumber. The end of January saw the situation so aggravated



A FEW LOGS ON "BUNKS"
One of the Transportation Problems

that even Government lumber was interfered with, and to protect themselves the western lines refused carload freight for the east. The condition continued until mid-February when the pressure brought to bear resulted in an acceptance of all Government shipments without the necessity of embargo permits.

On March 11, an embargo was issued prohibiting all shipments east of the Illinois-Indiana state line, without excepting aircraft or other Government material. This was tremendously serious, especially as no advance notice was given the Division, and there were several solid trainloads of Government lumber en route at the time. As an immediate result all rail lines serving the mills producing Government lumber ordered their agents to refuse such shipments. Steps were taken to secure the acceptance of the trains then in transit, and by quick action an exception in favor of Government lumber was procured on March 17.

After this time little difficulty was experienced with eastern embargoes. A general embargo was issued September 16, 1918, restricting the movement of commercial lumber, which interfered for a time; but the Car Service Commission authorized the movement of practically all lumber on permits requested by the Division. This last embargo was cancelled in November.

Movements to and from the Cut-up Plant

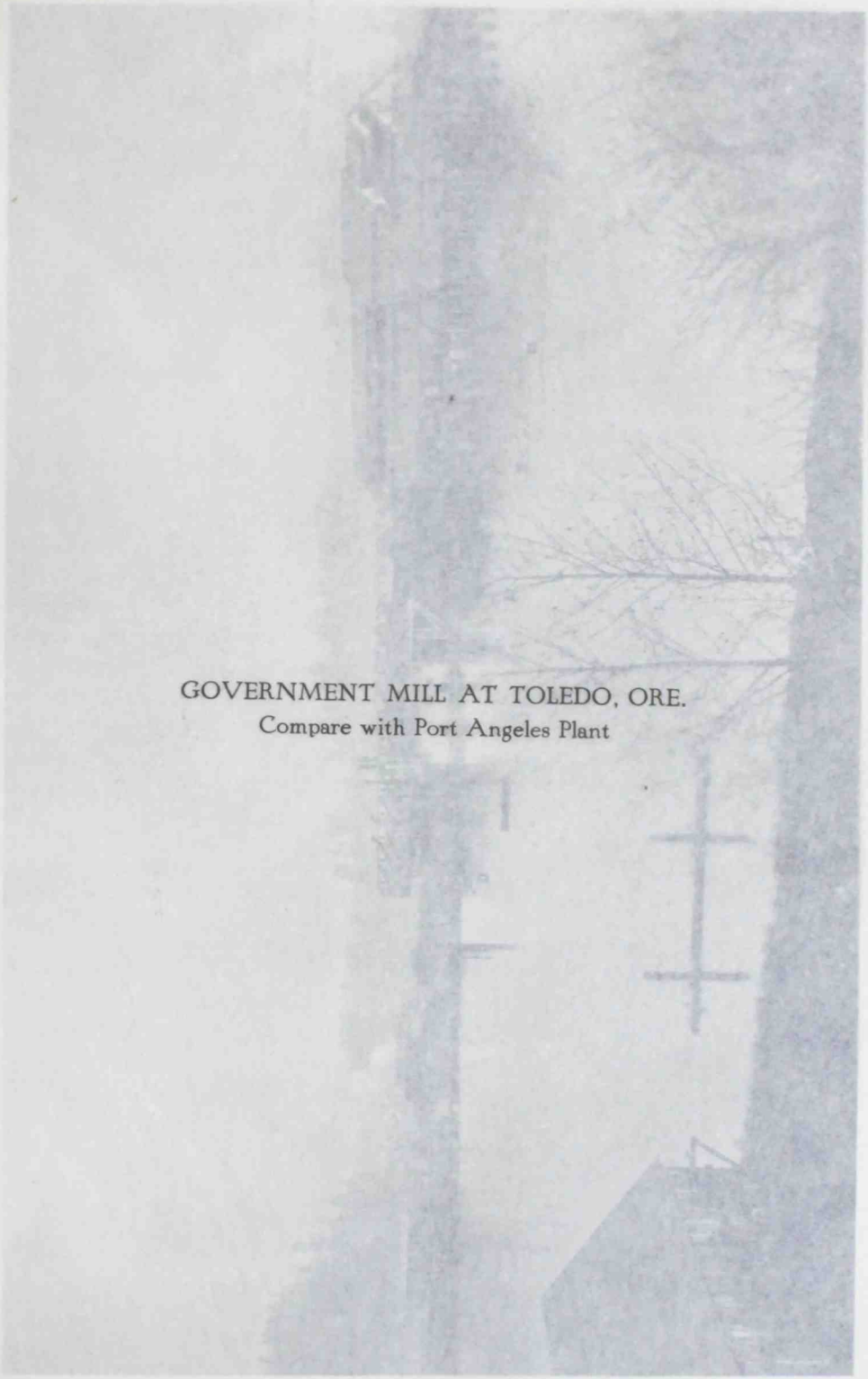
The construction of the Cut-up Plant at Vancouver entailed fresh duties upon the Traffic Section. Records had to be made covering shipments of all material and supplies entering into the construction of the mill, and later the movements of inbound cants and outbound aircraft material. An idea of the volume of this business can be gained from the average daily figures, the inbound carloads of cants averaging eighty to eighty-five daily, and the outbound carloads of aircraft material averaging thirty to forty.

So much will indicate the wide variety and complexity of the problems it was necessary to face and solve, in this vital factor of the Division's task. Meantime, and all the time, there was an immense amount of routine to be handled. A tracing system was established, together with a careful check on all movements, so that it was definitely known at all times what was in transit, and where it was located. The matter of rates was given skillful attention, and the best rates possible secured for Government shipments. Diversion charges were avoided, insofar as this was possible. A huge record system was built up, and reports furnished to the various departments, in some cases monthly, in some, twice a month, and in others, weekly. No matter what happened, no matter who threw monkey-wrenches and other paraphernalia into the machinery, the lumber had to be kept moving. Transportation was the life blood of production; if its steady flow were impeded or interrupted, the saws stopped whirling and the wheels ceased to move. It was a stiff fight, a vigorous "offensive", that the Division was compelled to maintain; but it had to win, else every other line of endeavor went for naught.

Reviewed statistically, the reports of the Traffic Section show a total of 7,908 cars of aircraft material shipped from August, 1917, to November, 1918, inclusive, representing a footage of 139,081,592, of which 68.9 per cent. went to the Allied governments. Cant shipments to the Vancouver Cut-up Plant totaled 12,730 cars. Of these 2,931 were rived spruce, and 3,937 sawn spruce; 5,171 were fir; 418 were rived cedar, and 268 were sawn cedar; four were hemlock, and one was larch. Four thousand two hundred and seventy-two cars of aero lumber were shipped from the Cut-up Plant, of which 166 were of kiln-dried stock. From the same plant were shipped 1,391 cars of commercial lumber, pulpwood, and cordwood. The solid train plan was inaugurated in mid-February, 1918. Between this time and Armistice Day, 390 of these "Government Specials" were sent on their way, the C., M. & St. P. railroad handling forty-three, the Great Northern handling forty-four, the Northern Pacific handling 149, and the O-W. R. & N. caring for 154. These 390 trains included 12,099 cars, 5,587 of which were aircraft lumber.

All this represents a number of shipments of lumber alone aggregating over 48,000. In addition, bills of lading were accomplished for 775 shipments of construction material for the Vancouver Cut-up Plant, 936 for the Toledo mill, and 23,046 for the cost-plus contractors and various operations, a total of 24,757 consignments. And finally, after the armistice was signed and Corporation property began to be shipped in to storage points, all transportation charges on these shipments were referred to the Traffic Section for approval and payment. Up to February, 1919, such charges had mounted to about $450,000.00.

In connection with transportation problems much credit is due to Mr. J. H. Regal, who assisted the Division officers in a most efficient manner in many ways, particularly in securing transportation for troops, both when we received our recruits in the first instance, and when demobilization was in progress. His service in this matter stands out in marked contrast with what was done in many other sections of the country in the way of troop train supply.



GOVERNMENT MILL AT TOLEDO, ORE.
Compare with Port Angeles Plant

CHAPTER VIII

The Military Command

T VARIOUS TIMES in the history of the Division, as some special and particular demand made it necessary, four military organizations were perfected, which took the name of "Provisional Regiments". The first of these was formed for guard duty at Vancouver Barracks, and was a strictly military organization, with strictly military functions. The Second Provisional came into existence when the Cut-up Plant was opened and began to operate under soldier labor. The Third Provisional was created as the logical successor to those detached squadrons which had been formed for the detail of motor transport, an important factor in getting out spruce. The Fourth Provisional was organized to construct the big saw-mill at Toledo, Oregon, and would have continued as a suitable unit for operating the mill, had not the halt of operations made it unnecessary.

For purposes of military command the territory covered by the Division was divided into districts, as given on pages nine and ten, and in the organization chart. There were, it is true, four provisional regiments, but they were organized primarily for local and subsidiary purposes. They did not, as separate units, bulk in the scheme of administration as large as the reader might infer from the fact that the story of each one is given separately in this narrative. Divisional administration was in general direct in its action upon the individual squadron (later through the District headquarters), so far as the work in the woods was concerned. One of the regiments was at the Cut-up Plant; one was at the Cantonment until Vancouver Barracks was turned over to the Division, when it was quartered there; one was mostly at the Cantonment and partly in the woods; one was at the Toledo plant. The 234 squadron and detachment camps throughout the woods were for some time administered directly from Headquarters through the office of the Divi-

sion Adjutant; later the military districts were organized, and squadron control was placed largely in the hands of the district commanders. The only squadrons in the field which were regimentally administered were those of the Fourth Provisional, and these only in minor matters. The point is that most of the men in the Division were not regimentally organized, and not only thought, but were actually administered, in terms of squadrons rather than regiments. Nevertheless, it is felt that these provisional regiments had their stories, which are therefore given here.

February 6, 1918, was the date of the organization of the First Provisional Regiment, under command of (then) Major R. C. Hill, with headquarters at the Cantonment at Vancouver Barracks. The Regiment consisted of twelve squadrons, each with a personnel of five officers and 150 enlisted men. On February 28, the troops were mustered for the first time as a Regiment, and personally inspected by Major Hill. Demobilization of the Regiment began shortly after the signing of the armistice, and was completed on February 4, 1919; the organization, therefore, having a life of an even year, lacking two days.

During this period the Regiment performed regular garrison duties as prescribed in Army Regulations, and in existing orders. The routine followed consisted of infantry drill, calisthenics, bayonet schools, the training of officers, and similar matters. One squadron, the 444th, later called the 12th Spruce Squadron, was, in May, turned into a military police organization, with general police duty in Portland and Vancouver. At the time of its organization there had been some thought that the Regiment might possibly be required for riot duty, but no need ever arose.

It was the special duty of the organization to furnish guard and fatigue details for the main Post, to which it was transferred from the upper Cantonment in June, 1918, and for the Cut-up Plant. During the months of August, September and October, this duty became so heavy as to require the services of practically every available man, and as a consequence, during this time, the general course of military instruction was eliminated to a degree. In the dry summer months, the Regiment furnished various details to fight forest fires in the states of Washington and Oregon. Such special duty was demanded as late as October. Also among its special duties was the unique one of searching for a lost child in the near-by forest, a detail of nearly 300 officers and men being furnished for this purpose. The First Provisional was the "handy man" of the Division.

Until May 15, 1918, the Regiment was under Lieutenant-Colonel Hill. On this date he was assigned to the command of the Clatsop military district, and the charge of the Regiment passed to Captain (later Major) John A. Baur, who had been in command of the 412th Squadron. On December 15, Major Baur was relieved to take command of the Second Provisional, and his place was taken by Captain E. P. Sorenson, who remained as commanding officer until demobilization.

Officers of the First Provisional Regiment also were called upon to assist as instructors in a special Officers' Training School established at Vancouver Barracks in August, 1918, and continued for some months in charge of Major Roy P. Tisdale, acting under Colonel Van Way. Young officers assigned to the Division not only took military schooling, but also received special training of such a character as was calculated to fit them for the tasks peculiar to the military establishment in the woods of the Northwest.

The Second Provisional

Lieutenant-Colonel (then Major) J. D. Reardan was responsible for the organization of the Second Provisional Regiment in the early days of February, 1918, and was its first commanding officer. The purpose was to provide a convenient means of administration for the men who were to operate the big Cut-up Plant. Originally the Regiment was composed of the troops which had been utilized in the construction of the Plant, the 401st, 402nd, 403rd, 404th, 405th and 406th Aero Construction Squadrons.

Work was begun on the erection of this mill on December 14, 1917, by the 401st Squadron, under the command of Major (then Captain) James P. Bradner. As fast as additional troops were required, the squadrons named above were added to the 401st, all troops engaged being under Major Bradner's command. The plant was opened on February 7, 1918, having been completed in forty-five working days. As the footage sawn at the Plant continued to increase, additional men were required. Early in March six new squadrons were organized, increasing the regimental strength to 1,500 men. They were designated as provisional squadrons, and took the numbers from one to six. Later their designation was changed to the 21st to the 26th Spruce Squadrons, and that of the original squadrons was changed to the 15th to the 20th Spruce Squadrons.

The Regiment not only operated the Plant, but also built a large loading shed in record time, and constructed the battery of dry-kilns, when these were determined upon, late in March. The excellence of the work on the drying system is attested by the fact that when the steam was turned into the system, not a single leak developed in the eighteen miles of piping, and over 20,000 fittings comprising it.

By July the personnel of the Regiment had grown to 2,400 men. In October it had risen to 4,700, with seventy-four officers. This growth was due to greatly increased demand. The Plant, originally designed for a capacity of 9,000,000 feet a month, turned out over 28,000,000 feet in October, during which month the average daily number of cars of airplane lumber shipped was forty-five. In addition to erecting and operating the Plant, a complete water system for fire protection was put in, trained firemen from among the troops being constantly on duty. A complete sewage system was installed, and also a lighting system of incandescent lamps and flood lights, as much for protection as for safe and efficient operation.

Colonel Reardan surrendered command of the Regiment in July, being assigned, as commanding officer, to the Yaquina Bay district, Major Bradner taking his place. The regimental *esprit d'corps* was exceptionally fine. The determination to win was never more in evidence on any field of battle. The men worked with effective enthusiasm at their undertaking, with the hope always glimmering just ahead of being sent "across". Then came the signing of the armistice. Work stopped. The regimental band turned out, and everyone celebrated for an hour. Then they returned to their tasks, finished them, and brought their labors to a conclusion. They had cut over 82,000,000 feet of airplane lumber in a Plant that one year before had not even been contemplated.

The Fourth Provisional

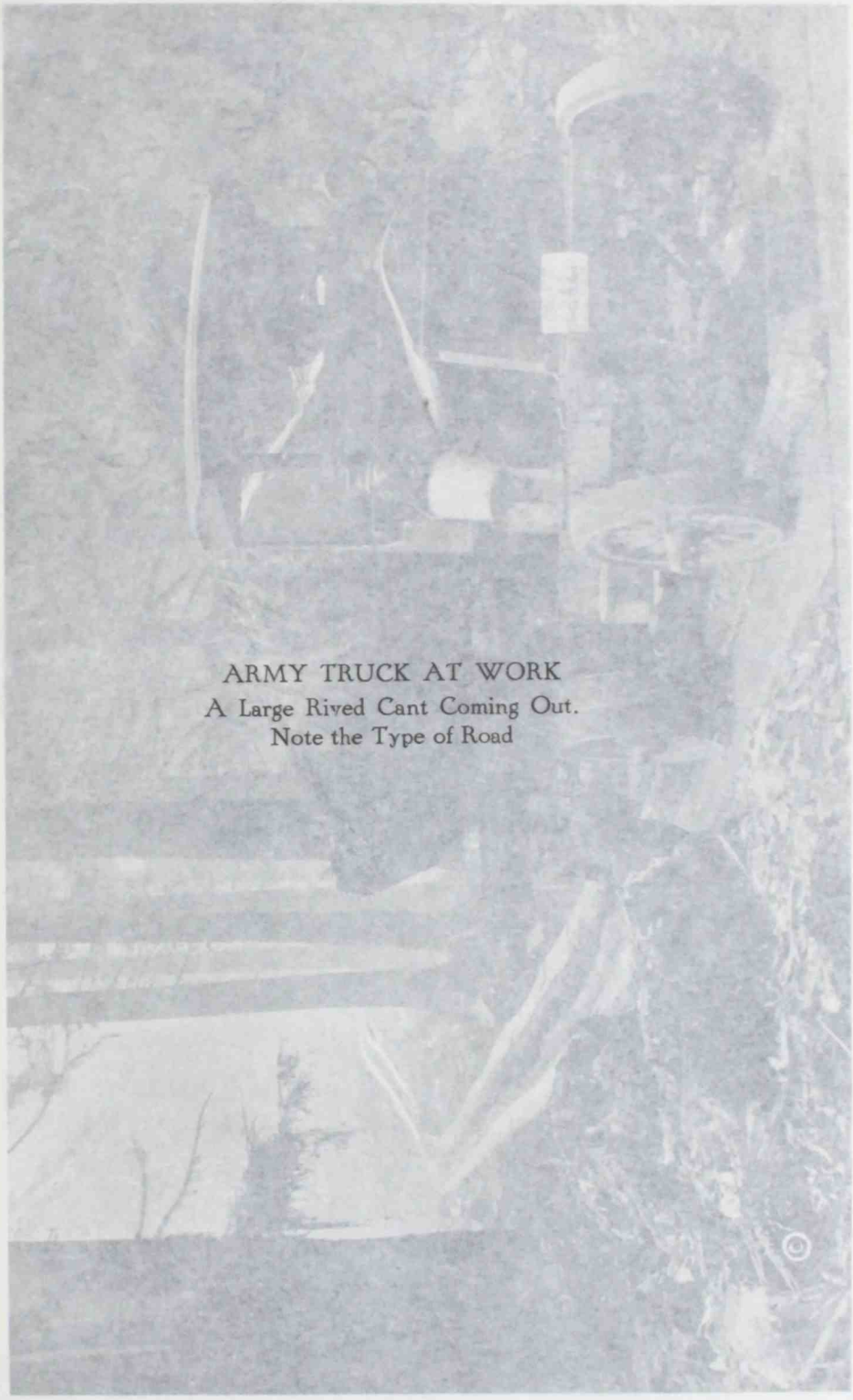
When Colonel Reardan assumed his duties as commanding officer of the Yaquina Bay district, he found a situation that seemed to necessitate a closely-knit military organization to construct "Sawmill No. 2" at Toledo, Oregon, and perform the necessary guard duty. He made such a recommendation on August 8, 1918, and it received endorsement from General Disque on August 20. Captain R. D. Grant was given command of the new organization, which was styled the "Fourth Provisional Regiment."

The chief duty of this command was to construct a sawmill and cut-up plant, covering eight acres, and including a power plant, sorting shed and machine shop. But all manner of other work was done. Detachments were sent out on railroad construction and operation, sawmill work, and pipe-line construction. In order to have the service needed for administering the affairs of the Regiment and of the industrial organizations within the Regiment, it was necessary to furnish help in the city of Toledo for the telegraph office, freight office, post-office, and bank. Labor was furnished also to two local sawmills in order to facilitate and hasten deliveries of lumber orders placed with them; and when deliveries of outside orders for piling were delayed, it was found necessary to establish a regimental piling camp on Yaquina Bay.

The Regiment had its own band, its own military guard, and eventually its own mess. A Regimental Exchange was opened, a Y. M. C. A. hut established, and, in general, all the advantages of a complete military organization acquired. At its greatest strength, the personnel included 728 enlisted men, and twenty-seven officers, with twelve other officers attached. It was disbanded during the late days of January, 1919.

The Transportation Problem

Motor transportation was the especial task of the Third Provisional Regiment, which was organized as such in July, 1918, though it had performed motor transport duty under other titles from December, 1917. It was in this month that Captain Thomas E. Markley selected from among the



ARMY TRUCK AT WORK
A Large Rived Cant Coming Out.
Note the Type of Road


242

troops at Vancouver Barracks a group of automobile mechanics and drivers, and formed two organizations designated the 425th and 426th Aero Construction Squadrons. They contained about sixty men each, selected by individual interview, and were the nucleus for the Regiment which was to come later. In March, a third squadron, numbered the 429th, was organized along the same lines as the other two, and the three squadrons were formed into a Transportation Unit, with Captain Markley as unit commander.

The strength of this organization at the end of the first month was eleven officers and 429 enlisted men, 136 of the latter being on detached service throughout the Division. On May 7, Captain Markley was succeeded in command by Major Marshall Henderson, Captain Markley taking duty as officer in charge of motor transportation in the field, and later being transferred to the First Provisional. At this time the personnel had grown to thirteen officers and 500 men, about half of whom were in the field. In July, the Regiment was formally organized, although a regimental organization had existed, in effect, since March. On September 7, Captain Louis Dorn was appointed its Adjutant. New squadrons were organized, and districts of activity were assigned to each. One of these was headquartered at Joyce, Washington, and included all the men of the Regiment on duty in the Puget Sound country. To another was assigned the Grays Harbor and Willapa Bay district, and a third had charge of all motor operations in the state of Oregon. The fourth squadron was that at headquarters at the Cantonment, Vancouver Barracks. The Regiment reached its highest development on Armistice Day, November 11, when its strength was twenty officers and 729 men, 366 of whom were in the field.

Two sub-departments of the work, organized as early as March, are of especial interest. They are the Transportation Supply Department, which provided for the supplies and innumerable repair parts necessary for upkeep, and the Maintenance and Repair Department. The latter had only field equipment to work with, but in spite of this, truck bodies were built, cars and trucks rebuilt and overhauled, and necessary repairs made. A blacksmithy was established for the welding and brazing of parts, and the forging of springs. There was also a tire shop which took care of vulcanizing and matters of tire-repair.

On the day of the signing of the armistice, the transport equipment of the Regiment included 226 trucks, 110 touring cars, twelve ambulances, and sixty-nine trailers—over a million dollars' worth of motor vehicles. Of this equipment 122 trucks, eighty-two Ford touring cars, ten ambulances, and all the trailers were in the field, the remainder being used at the Cut-up Plant, and in the vicinity of the Post.

The Regiment suffered the loss of its commanding officer on January 15, 1919, when Major Henderson died of influenza at the Post Hospital. Captain Dorn assumed command the day following.

The first duty of the transportation squadrons was in connection with distributing quartermaster supplies to the various camps of soldiers, as they were established in the woods. The heavy burden of the transport of materials in connection with the construction of the Cantonment, at Vancouver Barracks, also fell on the motor squadrons. The initial difficulties were many. The first cars that came into the possession of the unit were second-hand machines purchased from the State Highway Commission of Washington, and they were in none too good condition. Equipment for making repairs there was none. The mechanics did the best they could with a hammer, a saw, a monkey wrench, and a pair of pliers, plus what language was an absolute necessity.

"Moving" the Cut-up Plant

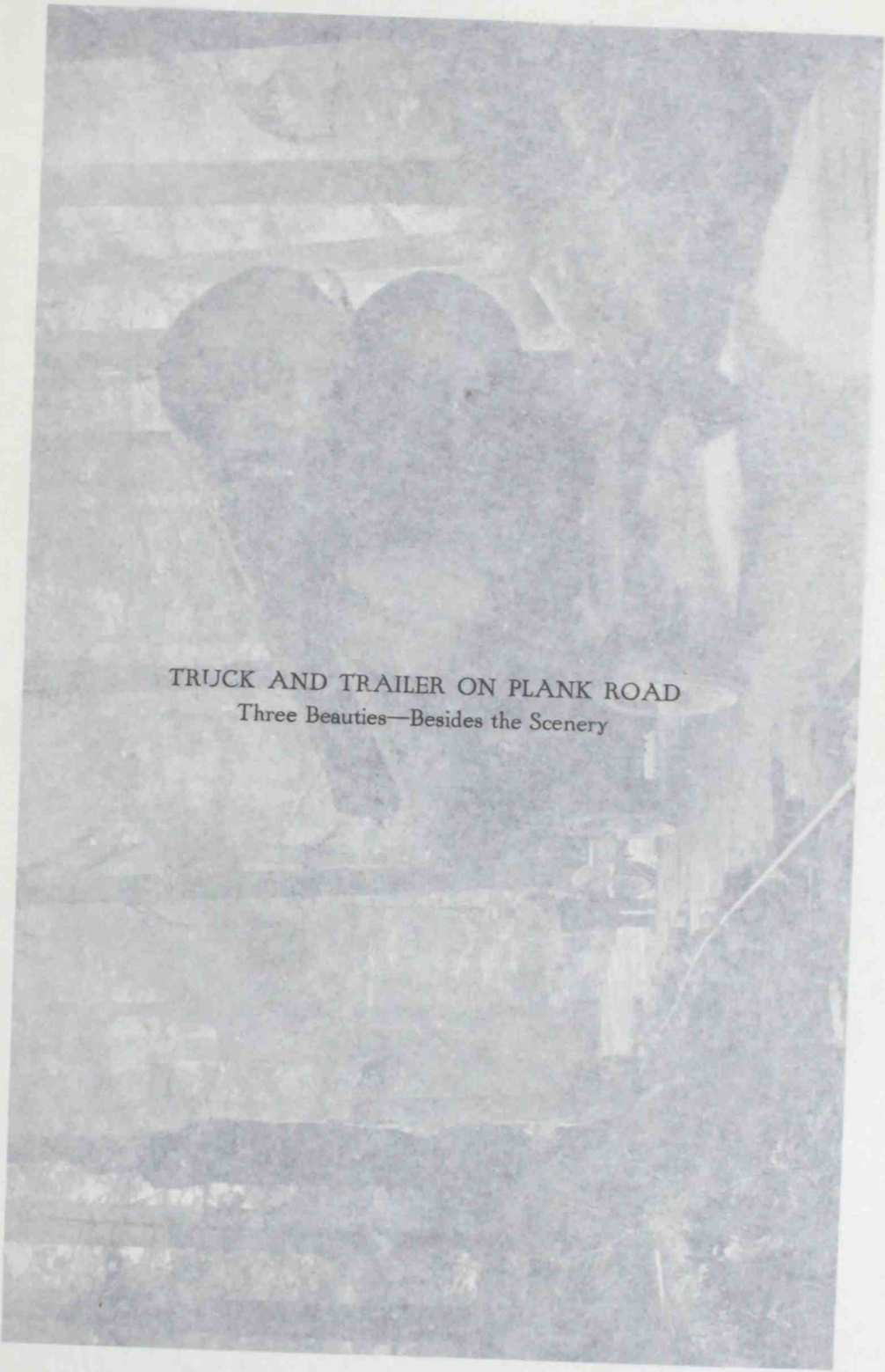
But the big job during the winter months was in connection with the building of the Cut-up Plant. The actual construction followed so quickly after the decision to erect, and there was such haste, that materials could not wait until railroad spurs could be built to the site of the big mill. Pending the completion of such spurs, the motor transport squadrons had to step into the breach.

Men at work on the plant must be brought to and from the job. They were quartered in the Cantonment, a mile and a half distant. There were seven or eight hundred of these men engaged in the work, and they had to be hauled each way each day, the equivalent of a daily business of some 1,500 passengers. Roads were unbuilt. The rain came in torrents, and the mud collected hub-deep. Chains were an unknown luxury. Yet the unit was able to get by with its task and score 100 per cent. safety, so far as accidents to the passengers were concerned.

The moving of material to the Cut-up Plant was even more of a task. Large quantities of lumber, hardware and other building materials came from Portland, a distance of ten miles, via the motor truck. Thousands of tons of machinery, landed by the railroads at the Portland depot, likewise had to be trucked to the mill site. Such an undertaking was not accomplished without indefatigable effort. The motor truck squadrons literally never slept. For weeks they were at it night and day, hampered by rain and weather, by shortage of trucks, and by lack of equipment for making repairs. But they got the materials, the machinery and the men to the site on time, and earned a share in the notable accomplishment which flung up the big mill in record time.

The Work in the Woods

Then there was the work in the woods. Here the trucks were called upon to perform almost Herculean miracles. Mahomet could probably have gotten the mountain to come to him, if he had had the good judgment to organize a motor transport unit. Until the Division Railroads were built, the trucks had to take the place of them. They were an indispensable link in the



TRUCK AND TRAILER ON PLANK ROAD

Three Beauties—Besides the Scenery

riving operations, for it was up to the truck to bring the rived logs to the mill or the water, after they had been split in the forests.

Such work is apt to be a bit heavy. A green log thirty to forty feet long and six or eight feet in diameter will average fifteen or sixteen tons dead weight. But the trucks staggered along under it. Was there a donkey engine or a cradle to be hauled to its place in the woods, where it could do the most damage to the hopes of Hohenzollern Bill? Call—not a taxi, but its equivalent in the woods—a truck and trailer. Did a locomotive somehow have to be gotten to its place on the rails, across some rough terrain? Whistle for the motor boys.

The roads in the woods are not what might be called really first class. Corduroy road through the swamps can be built at a cost slightly under that of the Appian Way, but the going is a reminder of Billy Sunday's Ford—it shakes the devil out of you. To say nothing of the effect on the detachable parts of the car. The going along the beaches has not the disadvantage of a correct imitation of fever and ague, but there are frantic moments, when you try to dig a five or ten ton load out of its lodgment in the sand, with the flood coming in, strong and salt, exemplifying the ancient apothegm to the effect that time and tide are poor waiters.

The road problem was passed up to the engineering department, which constructed many miles of plank road through the woods, up hill, down dale, across ravines, and through swamps, making possible the work of trucking in the deep, green forests. Sometimes these roads were of heavy plank, laid close together and at right angles to the path of the truck; a solid floor of timber for the truck to travel on. But this took much material. Another type of road was designed, called the "fore-and-aft", in which the planks were laid lengthwise, and after the fashion of a rail, at just the proper distance apart to allow for the traction of the cars. Stringers, run along the inside of each row of planks, four or five inches in height, served to keep the cars on the track. Cars could not, of course, pass each other on such a road, but frequent turn-outs, or switches, were built to permit this. This particular type of road worked very well, and was relatively cheap.

The trucks were able to maintain an average of nearly five miles on a gallon of gasoline during the dry weather. When the rains descended, the average shrank considerably—almost to three miles. But around headquarters the five-mile average was maintained. Statistics give some idea at least, of the amount of work done, even when they are partial. Those appended are for the cars at headquarters, during the six months' period from July to December, 1918. The tonnage would, of course, be greater in the woods where the heavier loads were carried.

CHAPTER IX

The Medics' Mission

HE NECESSITY of a thoroughly equipped and competent Medical Corps to an army in the field is too apparent to require comment. An army in camp or barracks likewise must have the constant vigilance of those in whose charge the health of the command is placed. There were, however, some distinctive phases of the work of medical men in connection with the Spruce Production Division. Speaking by and large, the medical problem may be summed up in the words, "living conditions," under the two-fold aspect of camp sanitation and food conservation. There were also, of course, the usual questions as touching the care of the sick, which arise in any military organization, augmented by the hazard of injury to the men, owing to the nature of the work in which they were engaged.

The senior medical officer, at that time Major Blackmoore, arrived in Portland, November 20, 1917. At that date the medical staff consisted of this officer and one lieutenant. By the end of the month, however, the personnel of the department had increased to 126 enlisted men and thirty-one officers. Later this grew to an enlisted personnel of about 400, with approximately 150 officers. Half of this force was engaged at the Vancouver Post Hospital, and at the Cantonment, the remainder being in the field. Ultimately, the department was placed in charge of Lieutenant-Colonel J. W. Sherwood, who was the Division Surgeon during most of the period of the Division's existence. In November, 1918, Colonel Sherwood was relieved and assigned to more active duty, and Colonel Rudolph G. Ebert was sent to take his place.

The subject of caring for the sick introduced an early problem, especially with reference to where they might be housed. So far as the Cantonment was concerned, the logical disposition of the sick seemed to be the Post Hospital at Vancouver. But there was objection to this, since the Hospital at that time was under the Western Department, whereas the Division and the Cantonment were not. To cover the situation a temporary hospital was impro-

vised from two barracks, vacated for the purpose. Later, after a visit from the Chief Surgeon of the Aviation Section of the Signal Corps, the makeshift was abandoned and authority secured to transfer the patients to the Post Hospital.

As touching the men in the field, instructions were given, because the detachments were scattered over a large territory, that the nearest civilian or military hospital should be resorted to, in the event of any being so seriously ill, or so severely injured as to be beyond the resources of the medical officer in the field. This method was not materially changed.

As the first detachments went into the woods, it was the practice to send with each one a medical officer and one or more enlisted men of the Medical Corps, each taking with him the "Special Equipment for Aero Squadrons Acting Independently". This method of distribution was changed when a shortage of medical officers compelled an attempt at concentration. A survey was made in the Grays Harbor district, as a result of which the whole territory covered by the Division was later divided into regularly recognized districts, each with a District Surgeon.

In March, 1918, a threatened epidemic of cerebro-spinal meningitis among the men of the command was narrowly averted by vigorous measures. Some eight cases occurred. In addition to ordinary preventive measures, the entire command was treated by spraying the upper respiratory passages. This treatment not only stayed the epidemic but improved the general health of the officers and men of the Division. Again, in the fall of 1918, the influenza pandemic, general throughout the country, threw a tremendous burden upon the medical staff, but was so successfully handled that the Division death rate was held to 6.23 per thousand, a total of 182 fatalities occurring.

Cleaning House in the Camps

One of the chief distinctive labors of the medical department, however, was the problem of camp sanitation. Early in the history of the Division, an inspection of the Grays Harbor district was made, to learn something of the conditions under which the men must live; and, following suggestions that rose out of this inspection, the camps of this district shortly became the model for camps elsewhere. But the camp sanitation question did not rest with the perfecting of sanitary arrangements in the soldier camps. The organizing officers of the Loyal Legion had promised the civilians who signed the Legion pledges that the Division would undertake to see that justice was done for them, if they would give their whole attention and energy to production. One of the sources of unrest, and of trouble between employer and employee had been the living conditions in the camps. Consequently, seven sanitation officers were assigned to the Loyal Legion, whose duty it was to investigate and to improve the sanitation conditions.

A thorough investigation was made covering a total of 900 camps, affecting the environment of some 100,000 men. These camps were of a wide variety. Some were located on tidewater at the edge of the Pacific. Some

were far up the mountain sides of the panhandle of Idaho. Climate, weather and conditions generally, differed vastly. What was feasible or advisable in one type of camp would not be feasible or practicable in another. And the investigation and recommendations had to take all this into consideration.

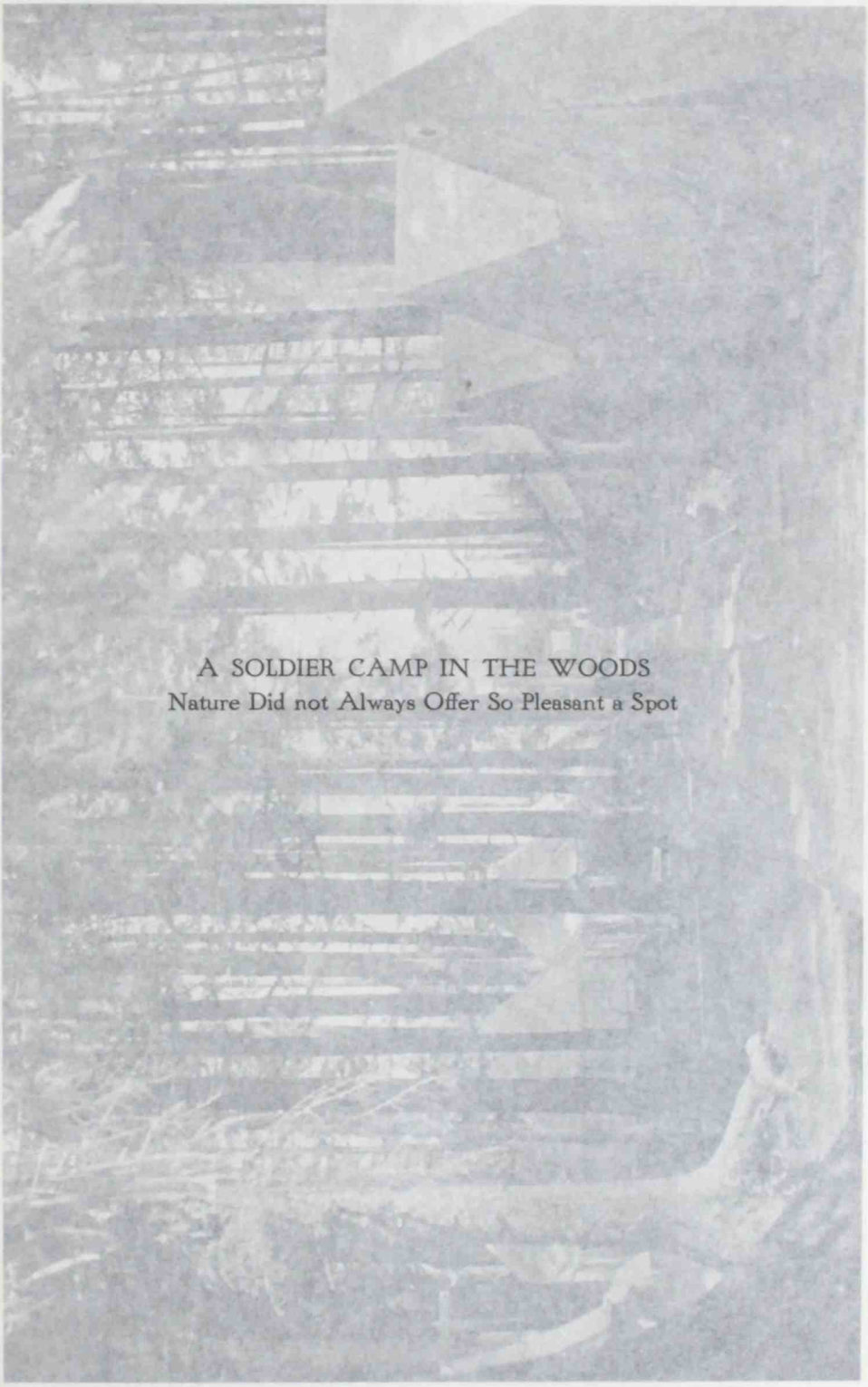
It was recognized that the sanitation situation would have the same effect on civilians as on soldiers; that men well-housed, clean, and well-fed, would be more efficient than those not so cared for. The operators, or the great majority of them, taking cognizance of this, expressed their willingness to co-operate in every possible way with any plan of improvement. The investigation revealed, in many instances, abominable conditions. The housing standard, and the sanitation standard, were alike far too low, largely because both operator and operative took such conditions seemingly for granted.

As a result of the investigation, and for the guidance of all concerned, a pamphlet was prepared on Camp Sanitation, and placed in the hands of those interested. This was done by Captain T. Tharaldsen, with the co-operation of others. The pamphlet is most complete and of permanent value, and its influence will undoubtedly be felt to the lasting improvement of camp living conditions in the Northwest—one of the memorials which the Division leaves behind it. Every item that goes to make up living in decency and comfort receives treatment; and recommendations are confined to what is reasonable, possible and practical.

Nor did the work of the Division stop merely with recommendations. Where conditions were not improved, pressure was brought to bear until they were improved. Poor latrines were condemned, cook houses ordered screened, bathing facilities ordered in. The men caught the spirit of the new day, and the Legion officers on their rounds visiting the camps frequently met complaint of the men that Bill or Tom or Jack as the case might be, had a practice of expectorating on the bunk-house stove, or appearing at meals in a dirty shirt. The officer needed only to call the recreant's attention to his comrades' objections, as a rule, to get matters rectified. But, one who carries a mental picture of the "rough-tough-and-hard-to-handle" woodsman, might well ejaculate, "Fancy a lumberjack objecting to a dirty shirt!" Yet they did object, and they made their objection stick. The percentage of improvement in living conditions would be hard indeed to estimate. But it has been great, and has proven its own economic worth. It is to be hoped that the improvement is permanent, and will augment from year to year by the force of its own momentum.

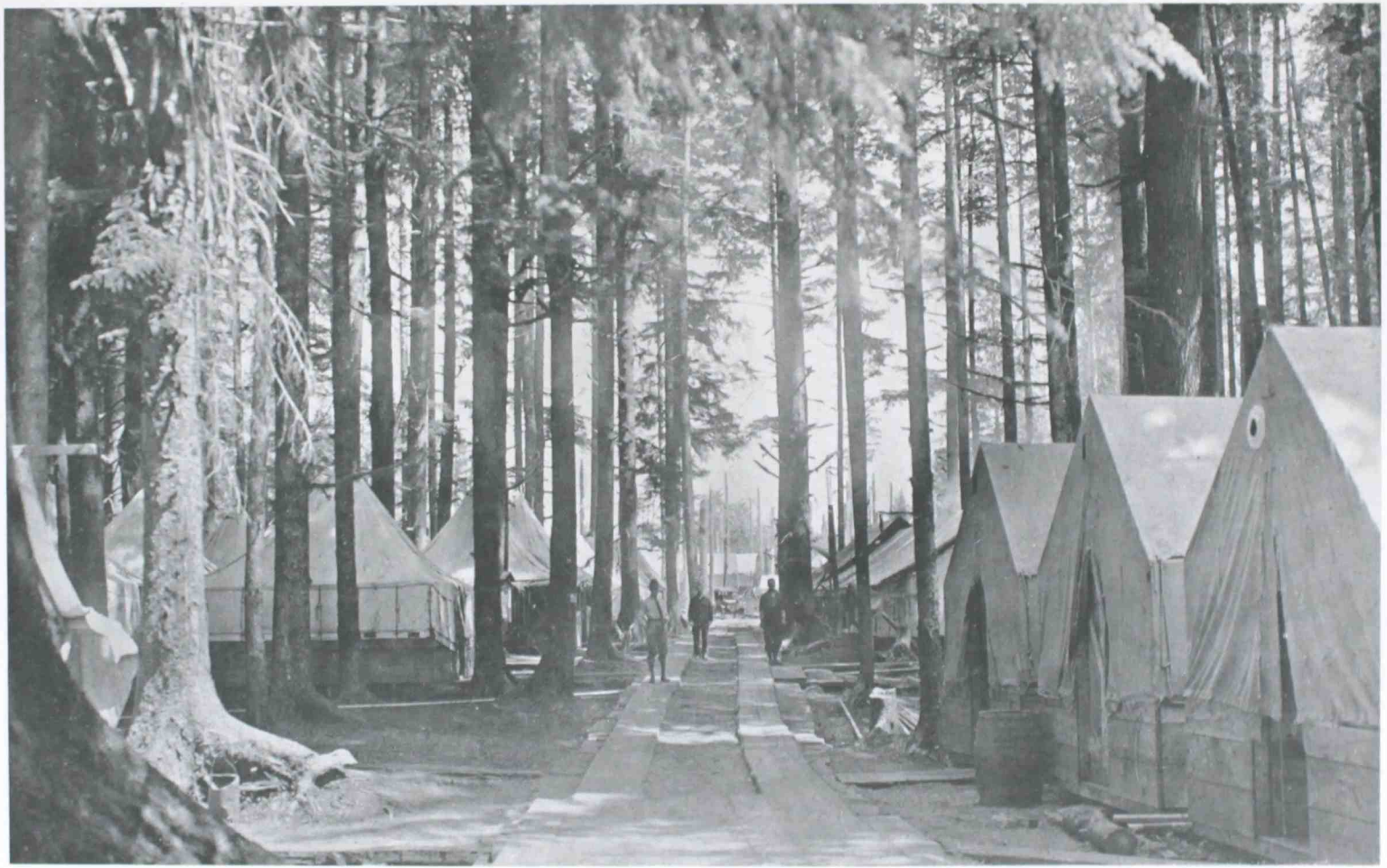
Food Waste

To Captain Tharaldsen also fell the mighty problem of food wastage and food conservation in the camps. This involved much more than appears on the surface. At a time when a general food shortage obtained throughout the world, and at a time, too, when the operators, deprived of the usual method of bidding for men by advance in wages, fell back on the practice of bidding for them by superior table, the adjustment necessary to be made was no small task.



A SOLDIER CAMP IN THE WOODS

Nature Did not Always Offer So Pleasant a Spot



Those who frequent the lumber camps are usually satisfied that the lumberjack lives exceptionally high, as touching his food. The service may be far from pleasing to the epicure, but from a purely "grub" point of view, little fault could be found. The food is plentiful, various, and usually well-cooked. But survey showed the wastage to be enormous, a conservative estimate fixing it at from twenty-five to thirty per cent. Pounds per man in the logging camps exceeded that of any other industry in the world. It was double the army ration. The saving of a half pound per man, it was reckoned, would result in the salvage of 27,325 tons of food, or 1,800 carloads. This on the basis of 100,000 men, and rather more than this were fed in the 1,500 camps of the Northwest. Figuring the average price per pound at ten cents, the half-pound salvage would mean a money saving of over $5,000,000.

Waste was due to several factors. Buying was often in the hands of inexperienced people. Lack of foresight, and duplication of purchasing agents, made for getting more food on hand than could be consumed before spoiling. Lack of facilities for storage, and for protection against vermin, had the same result. Table waste was another very potent factor. Too great a variety was served. Two to four kinds of meat were nearly always on the table, and three to six sorts of pastry. The natural avidity of men with keen appetites also made for waste, in taking more on the individual plate than could be eaten—a case of the eyes being bigger than the stomach. The portions on the platters generally were too large. Food sabotage was practiced, though to a very limited extent. When the cook fell down, there was the additional factor of impalatability.

Making Good with the Cook

The camp cook is a most important functionary. A poor cook means a full garbage can, and discontented men. A good cook can save his own wages. But, the camp cook is also as temperamental as a society musician, or a cubist painter. He belongs to the artistic class, and has the artistic foibles, chiefly an ineluctable aversion to criticism of his art. Such criticism, if he overheard it, was apt to have immediate and disastrous results. If someone commented adversely on the coffee or the beans, he resigned to take instantaneous effect. Resign, indeed, is scarcely the word. He just naturally rolled up his apron and quit. This temperamental weakness of the cook led to a most curious rule in the camps—"No talking during meals." The result was that the men bolted their food, the natural tendency to do so augmented by the rule of silence. A woodsman will easily dispose of a huge meal in six minutes, thereby exemplifying the ancient proverb to the effect that haste makes waste. For the slow eater eats less and assimilates more.

To apply some curative measures to the situation, after having discovered its causes, was Captain Tharaldsen's task. He urged and recommended efficient and careful buying, and provision for proper storage. He tried to secure the abolition of the silence rule at meals and in some measure succeeded. Through the Loyal Legion, appeal was made direct to the men for

personal co-operation, it being promised that, should appreciable saving be effected, the price for board would be reduced.

But most of all, the standardized mess for all camps was emphasized. Tables were drawn up for the guidance of cooks and purchasing agents, showing the pounds per man that should suffice for a well-balanced ration, indicating each leading commodity. A model three meal menu was compiled. A form of monthly report was drawn up, and though it demanded a good deal of the cook, it was used by a large number of the camps to the benefit both of their mess, and of the conservation program. This report called for the approximate daily average of men fed; for the total number of meals served throughout the month; and for the total poundage used for each of the foodstuffs ordinarily employed—meat, eggs, fats, grains, fruit and vegetables, and sweets. It also called for the total pounds per man.

These "Records of Food Used" were first distributed in August, 1918. The actual conservation and elimination of wastage is clearly shown by a comparison of the records of this month with those of the months following. Of course, the elimination of all waste in so brief a period would be out of the question. But the figures indicate exactly what was accomplished by the application of the conservation methods outlined above.

In August 230 camps reported, serving a total of 1,548,955 meals; in September 340 camps reported 2,069,598 meals served; in October the totals were 357 camps and 2,091,448 meals. On the basis of an allowance of two pounds per meal per man, the food wasted in the camps reporting during August aggregated the staggering total of 2,155 tons. In September this wastage had been cut to 1,606 tons, and in October it fell to 1,219 tons. This means a relative saving for September of 549 tons, and for October of 936 tons, a total relative saving of 1,485 tons, or nearly $300,000 worth of food, reckoning the cost at ten cents a pound. Not all camps were wasters, and the percentage of those who kept within the two pound limit steadily increased.

Another interesting comparison may be made from the reports of the 280 camps which submitted reports for both September and October. In September the wastage in these camps was 740,697 pounds; in October the same camps had cut their waste to 574,964 pounds, a saving of eighty-three tons. In October 255,856 pounds less fruit and vegetables were served in these 280 camps than in the previous month, despite the fact that the total of meals served was greater in October than in September by 54,385.

But the total elimination of waste was constantly emphasized. When a camp cook achieved the standard set, he was presented with a diploma, giving him the title of Registered Camp Cook, and signed by General Disque and Food Administrator Herbert Hoover.

CHAPTER X

The Legal Problem

THE PROBLEMS of the Division were not wholly physical, relating to such direct matters as the supply of equipment and labor, the logging of spruce and its movement toward the mills, and ultimately to the factories. A number of incidental questions were involved. We may speak of them, perhaps, as professional problems, since they demanded the talents and training of men belonging to what are commonly called the learned professions.

Such as the law, for instance. It would seem that it would require a logger and not a lawyer to get out spruce. But, howsoever necessary the logger is, it was early discovered that the lawyer is indispensable too. The Legal Department, as such, was not established until July 10, 1918, with Major John E. Morley in charge. But, prior to this time, much legal work had been done in the Division, chiefly the drafting of contracts. This had been cared for by the Contract Section of the Supply Department, and was in charge of Captain P. W. Cookingham.

Not only was it up to the Contract Section to handle the ordinary problems arising in the business world, but difficulties were encountered because of the fact that these were Government contracts. First of all, it was never quite clear just what the requirements in Washington might be. Of two contracts apparently drawn on the same theory one would be approved, and the other disapproved. Sets of papers would be prepared covering a transaction, in accordance with latest advices received from the Capital. Not infrequently before these could reach Washington, it would be learned that new forms and requirements were necessary, and a new set of papers had therefore to be drawn up. The matter was taken up from time to time, and some of the obscurity removed, but frequent changes in form and requirement continued to harass the Contract Section, and it seemed hard to get any advance advices as to what the requirements were liable to be.

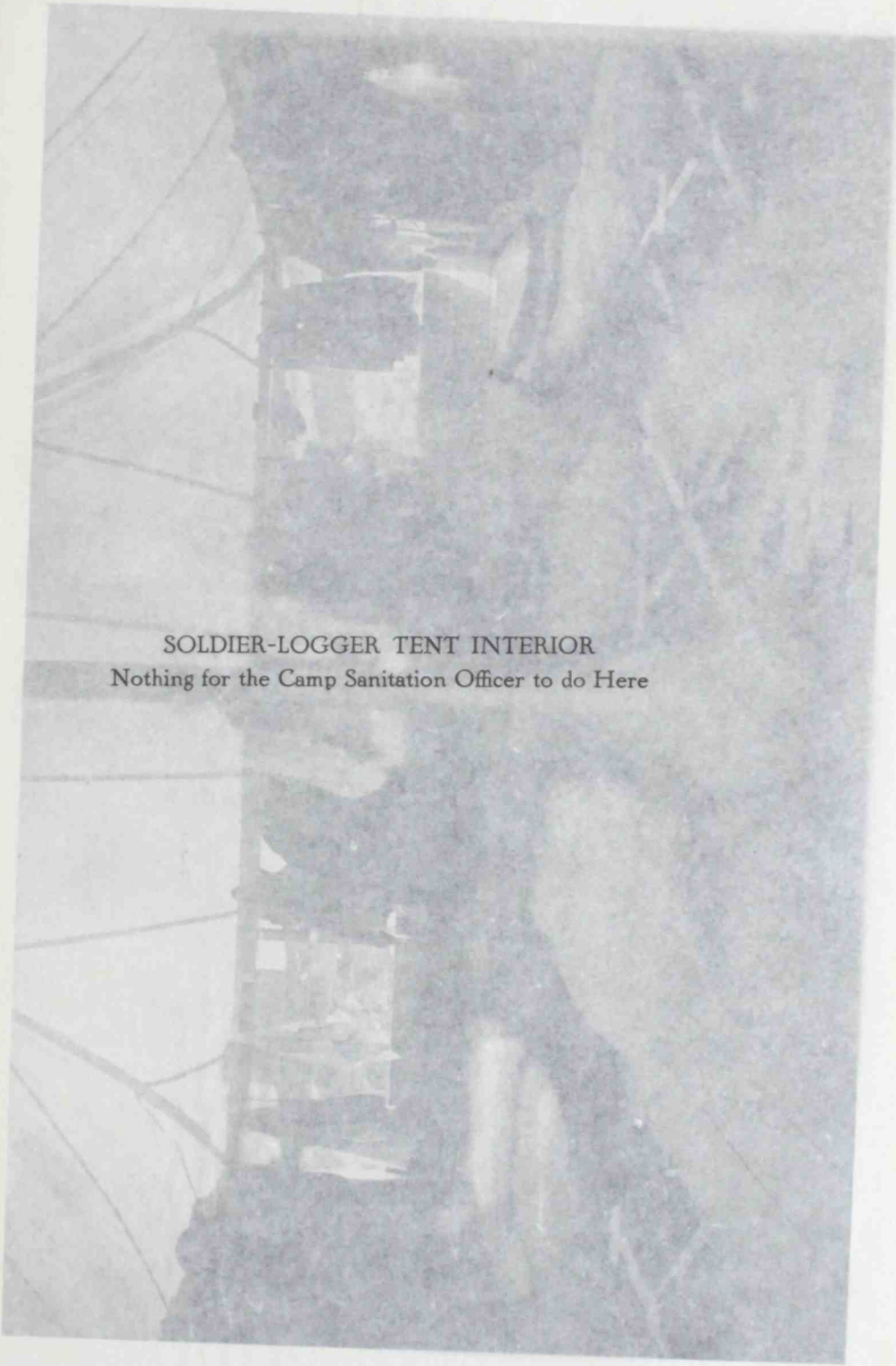
Orders set forth in Washington also made difficulty by reason of limitations in matters concerning which contracts could be made. Terms, which

as a matter of business fairness and expediency seemed appropriate, would be prohibited by the Washington orders. In addition, doubt existed as to just what persons were authorized thus to limit the methods by which the Division could pay out its money.

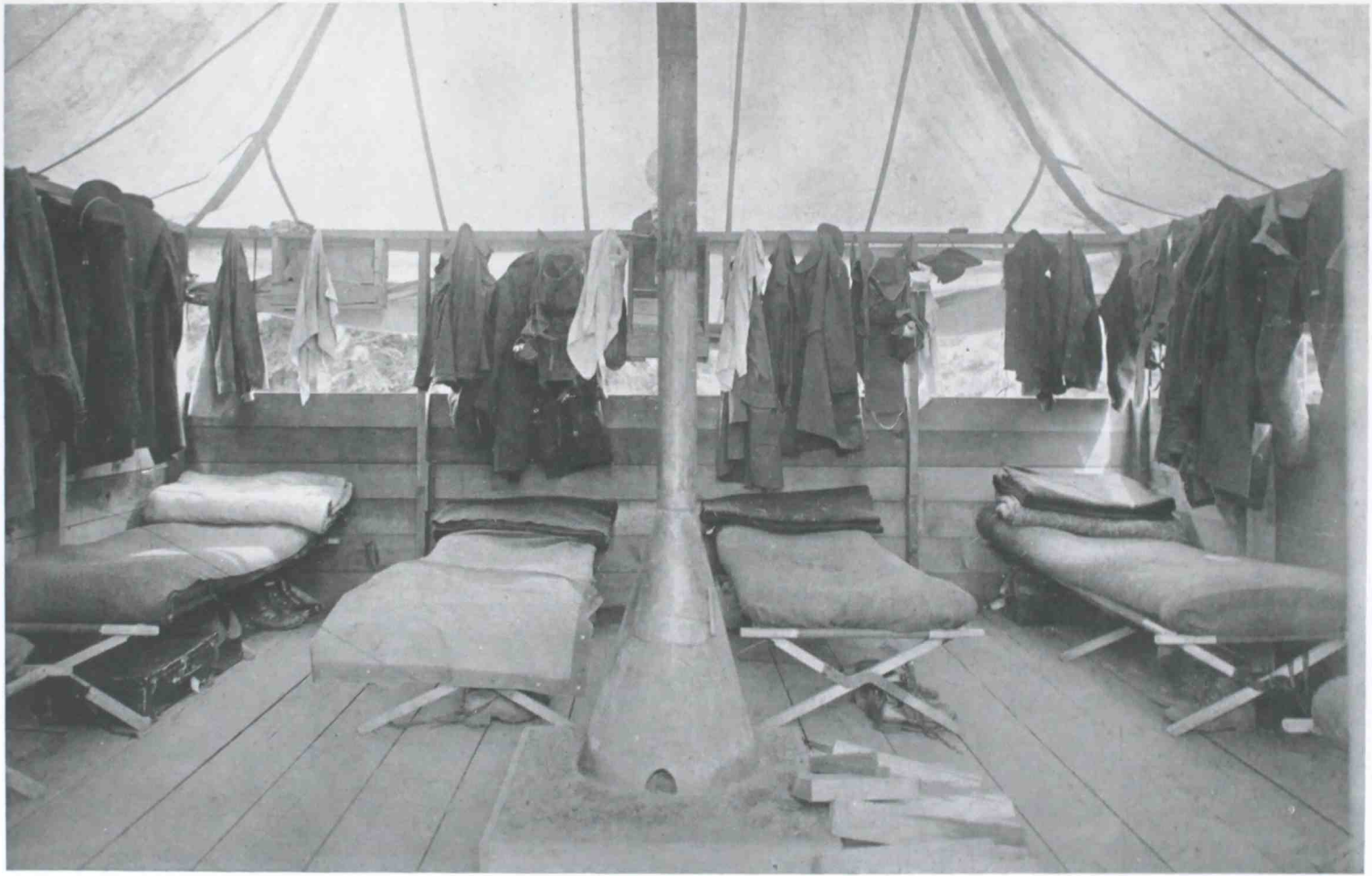
Perhaps the most complex legal problem of all arose out of the circumstances attendance upon the whole program of the Division, introducing an element over which little, if any, control could be gained. The spruce business was new and growing with constantly accelerated rapidity. It was frequently impossible to determine, when a contract was made, just what course events would take, or just what course the Government would take. Thus it became necessary to write into some contracts provisions permitting the Division to change the operations under that contract at any time it might be deemed expedient. Because of such a clause, operators not unnaturally felt some hesitancy about entering into the contracts; yet on the whole they realized the peculiarities of the situation, and showed a disposition to trust the officers of the Division to see that no injustice was done by any such changes. But, in spite of difficulties, aggravations and exasperations, the Section weathered the storm, and kept the wheels oiled. The vital importance of its work will be realized by anyone who grasps the fact that unless contracts can be executed, little work will go forward.

An idea of the growth of the Section, as well as of the magnitude of the work in general, can be given by the recitation of some of the wholesale figures entering into these contracts. Twenty-three contracts for spruce lumber were entered into in the month of December, 1917. These covered a total of over 75,000,000 feet, and monthly deliveries of 4,325,000 feet. This month also saw the working out of the first of the cost-plus rived spruce contracts, that with the Grant-Smith-Porter company, covering 100,000,000 feet of rived spruce. January added eleven spruce lumber contracts, covering a total delivery of nearly a million feet a month, and also eight rived spruce contracts, two of these being on the cost-plus basis. Two lumber contracts and four rived spruce contracts were added in February, and about the same number in March. In April the first logging contract was executed, and this month one rived Port Orford cedar, and one rived spruce contract were also approved. May added two riving contracts.

Along with these, there were, of course, a variety of ordinary commercial contracts entered into; of importance, but of less direct interest to the spruce program. May also saw the execution of two highly important contracts with the Siems, Carey-H. S. Kerbaugh corporation. One of these was for the delivery of 250,000,000 feet of spruce flitches, and the other for the construction of a branch railroad line to connect with the Seattle, Port Angeles and Western Railway company's present line. In June appeared a new type of contract, in the sawing agreement, under which the mill took over Government-owned logs and sawed them into cants and flitches, or other specified products.



SOLDIER-LOGGER TENT INTERIOR
Nothing for the Camp Sanitation Officer to do Here



Incident to the main work of the Legal Department rose the need of creating a special Section to secure the rights of way for the various permanent Division railroads, involving the acquisition of properties, the drafting of deeds, the examination of titles and clearing them of defects. This Section was created shortly after the Legal Department was erected, with Lieutenant John P. Murphy in charge.

Acquiring Rights of Way

As was the case with so much of the work of the Division, the Right of Way Section began with the idea that the item would be small and inconsiderable; but the work of the Section increased rapidly in volume and complexity, until the staff included four attorneys, together with the necessary clerical force, and a contingent of right of way agents. It became necessary to establish a branch of the Portland office at Newport, Oregon, under Lieutenant Franz U. Burkett; and the Section also supervised the securing of rights of way for the Seims, Carey-Kerbaugh corporation, who employed the law firm of Farrell, Kane & Stratton of Seattle as their agents in this matter; this firm worked under the Portland office.

Two of the four railroads for which permanent rights of way were sought are located in Lincoln county, in Oregon, and are the Division roads numbered XI and XII. The third is Division road Number V, in Pacific county, and the fourth, Division road Number I, in Clallam county, both of the latter being in the state of Washington. Together the four roads aggregate a total of about ninety miles of right of way.

To secure this, it was necessary to acquire approximately 200 separately owned parcels of land. That many different owners had to be dealt with; that many abstracts of title had to be examined, and in most cases abstracts had to be made; that many different deeds had to be drawn. The acquiring of these properties often taxed the resourcefulness and the diplomacy of the officers of the Section to the breaking point. They dealt with patriots sometimes, who were willing to pave the way to their success; sometimes with profiteers, who were willing to seize upon the situation as a means of fattening their own bank accounts. The task was not made more easy by the fact that all ordinary and orderly process was cast to the winds. Eventualities, and as a consequence the Government's plans, were so uncertain that it was necessary to buy the rights of way after the railroads were in process of construction. "They built the roads first and found out where they were afterwards." Had it been a private business concern, the Government was guilty time and again of high trespass and misdemeanor. Under the circumstances a large number of condemnation suits would have occasioned no surprise. Even under usual procedure, condemnation is frequently resorted to. Yet, owing to the tact of the Section's officers and agents, and the spirit of patriotism with which the owners very generally were imbued, not in a single instance were condemnation proceedings found necessary.

The roads went through some land that had been purchased, and held for years, with the express and specific purpose of selling as rights of way. Farseeing individuals had observed bodies of timber that some day must be tapped, and had bought up portions of the only means of ingress and egress, knowing that the time would come when they could realize on their investments. There were cases in which the saving-plan of a life time was thus involved. Yet these men stepped aside when the nation's necessity made the demand upon them, and sacrificed their holdings.

Or again; the roads passed through properties for the owners of which the Right of Way Section had to scour the entire country. Much of the Lincoln county land, in particular, had been bought for speculative purposes, platted as summer resort property in tiny parcels, and sold far and wide to school teachers, professors, clergymen, and people in the East, who had never seen the land, and had never been near it. Taxes had been allowed to lapse, sometimes for as much as twenty years. In some cases the owners were not to be found at all, and the land was acquired through tax foreclosure.

But, in spite of all the tangles in the skein, the rights of way were purchased at a surprisingly low figure; lower than any institution, other than the Government, could possibly have acquired them. Close to six hundred acres of land were involved. The Alsea Southern (Division Road Number XII) required 105 acres, and the northern Lincoln county line, 116 more. The North Nemah (Division Road Number V), in Pacific county, needed 117 acres, while the Clallam county road, with its right of way, one hundred feet in width, required 235 acres. And there must be added the purchases for yards and terminals. With the exception of the Clallam county road, the land was bought at a figure that will not aggregate more than $30,000. The acquisitions for the Clallam county road were much costlier, as the line passed through some exceedingly valuable timber land. One stretch of fifteen miles cost $52,000, and the total for the right of way for this railroad is in the neighborhood of $70,000. These purchases, of course, included the timber standing on the land.

Formation of the Corporation

But perhaps the most vital work of the Legal Department was in connection with the formation of the United States Spruce Production Corporation. An event of great importance to the Spruce Division occurred in April, 1918, when Mr. John D. Ryan accepted appointment as Director of Aircraft Production. One of his first suggestions was the formation of a corporation to carry forward the Division's work. In pursuance of this suggestion, under the Army Appropriation Act of July 9, 1918, provision was made authorizing the Director of Aircraft Production, whenever in his judgment it would expedite or facilitate the production of aircraft, or aircraft materials, to form, under the laws of the District of Columbia or any state, "one or more corpora-

tions for the purchase, production, manufacture and sale of aircraft, aircraft equipment, or materials therefor, and to build, own and operate railroads in connection therewith."

The act further authorized the Director of Aircraft Production, in behalf of the United States, to subscribe for, purchase and vote, not less than a majority of the voting capital stock of any such corporation, and to purchase all, or any part, of the preferred non-voting stock, bonds, notes, debentures, or other securities, issued by such corporation; and to sell, with the approval of the Secretary of War, all, or any part, of such stock, or other securities, provided that the United States should always hold a majority of the voting stock. It authorized the transfer to any such corporation of the interest and title of the United States in any contracts, or property used in, or in connection with, the production of aircraft, aircraft equipment, or materials therefor; and the assignment for duty with such corporation of any enlisted men, or commissioned officers of the Army, as might be desired in carrying on its work. The act also provided that, within one year from the signing of a treaty of peace, the corporation, or corporations, so formed should be dissolved and the assets liquidated.

This legislation, it was considered, would serve two ends. It would facilitate the strictly business functions of lumber production and sale of the product to the airplane factories in this country, and to the Allied governments, through the quicker and more direct business methods of an ordinary civil corporation. Moreover, through the sale of the securities of the corporation to the Allied governments, convenient means would be afforded of requiring the Allies to share in the cost of the capital expenditure involved. It was felt that this program was being carried on for their benefit, as well as for the benefit of the United States, and the intention was to sell to the respective Allies securities of the corporation in proportion to the amounts of airplane material severally required by them.

Upon Mr. Ryan's visit to the Pacific coast in the latter part of July, 1918, he took up with the officers of the Division the matter of the formation of such a corporation under the recently enacted law, and it was decided to organize a corporation under the laws of the State of Washington, to be known as "The United States Spruce Production Corporation." Accordingly, on August 20, 1918, the articles of incorporation of this corporation were filed, and its organization was promptly perfected. The capital stock was fixed at $10,000,000, divided into 100,000 shares of $100 each, all of which was subscribed for in behalf of the United States by the Director of Aircraft Production, with the exception of seven shares issued to the individual members of the Board of Trustees. The Board elected to conduct the affairs of the corporation consisted of General Disque; Colonel Stearns; Mr. W. M. Ladd of Portland, Oregon; Mr. J. J. Donovan of Bellingham, Washington; Mr. A. S. Benson of Portland, Oregon; and Mr. Mark E. Reed of Shelton, Washington. To these was added Mr. H. M. Bevis of Whites, Washington, the latter being elected as the representative of the Loyal Legion

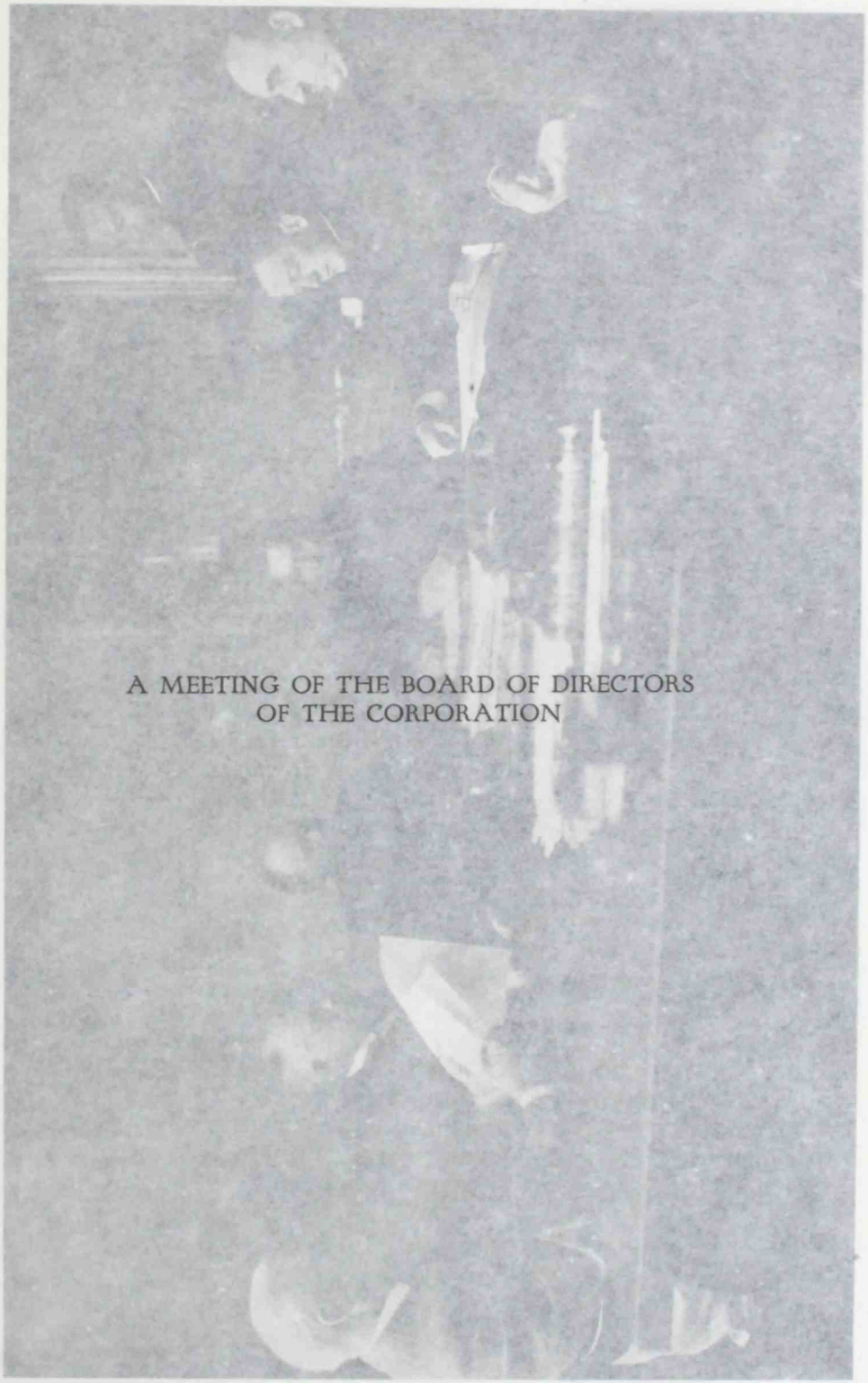
of Loggers and Lumbermen, taking the place of Major E. G. Griggs, who originally had been elected as trustee with the understanding that he would resign and give place to the representative of the Legion as soon as such representative should be selected.

General Disque was made president of the Corporation, with Colonel Stearns as vice-president, Mr. R. W. Moore as comptroller, Captain Alexander McAndrew as secretary, and Major R. S. Eskridge as treasurer. Captain McAndrew later resigned his office to permit the election of Major Morley, manager of the Legal Department, in order that the latter might be in a position to sign such papers as were incident to the Corporation's taking over the property of the Division, and issuing its debentures. The details of this matter were closed by Colonel Stearns and Major Morley, who had been sent to Washington for that purpose in the latter part of September, 1918. In order to conform to the desires of the Bureau of Aircraft Production, in connection with its plans for the conduct of the financial affairs of the Corporation, it was decided to combine the offices of comptroller and treasurer; to that end, Major Eskridge resigned as treasurer, and Mr. R. W. Moore, the representative of the Finance Division of the Bureau of Aircraft Production, was elected in his stead, thereby filling both the offices of comptroller and treasurer. Captain McAndrew was elected assistant secretary, and Captain W. W. Bleakley, assistant treasurer.

For the purpose of providing the necessary working capital, and for making payment to the United States of the value of the capital assets of the Spruce Production Division taken over by the Corporation, an issue of $25,000,000 of debentures was authorized, these debentures entitling the holders to participate in the proceeds ultimately derived from the liquidation of the Corporation upon dissolution. The debentures were, in the first instance, sold to the United States at par, and by it apportioned and sold to the governments of Great Britain, France and Italy, in proportion to their respective lumber requirements. The Allies in this manner were made to contribute to the cost of the capital assets involved in the production of spruce, in proportion to the respective amounts of lumber received by them.

The property of the Spruce Production Division was transferred to the Corporation by indenture, executed and delivered on October 10, 1918. This transferred the property as a going business, effective as of September 1, 1918; but, owing to the unavoidable delays in connection with closing a transaction of this magnitude, it was not until November 1, 1918, that the Corporation actually took over and began carrying on the production activities of the Division.

The change in the legal aspect of the conduct of the business did not, however, effect any substantial change in the conduct of operations as theretofore conducted by the Spruce Production Division of the Army. The personnel of the military organization was merely assigned for duty with the Corporation, and the same organization as set forth in General Orders Number 1, and outlined in an earlier chapter, was adopted by the Corporation.



A MEETING OF THE BOARD OF DIRECTORS
OF THE CORPORATION

CHAPTER XI

A Few Side Lines

HE story of spruce production can be recapitulated in half a dozen sentences; or it can be extended throughout half a dozen volumes. If we steer a middle course between a curt and dusty summary, and a tedious and prolix elaboration, and try to be exhaustive without becoming exhausting, there remain certain loose ends, side-currents and backwaters of the main stream of the Division narrative, by-paths of the traveled highway; but without which the story is not quite complete. They consist of a few matters incident to the military etsablishment; and of certain matters relative to the carrying on of the commercial business in which the Division and the Spruce Corporation were engaged; to which may be added some mention of the considerable problem faced by the Department of Commercial Sales.

Superficially, at least, none of these items looms so large in import as the problems of labor and equipment, of operation and construction, which already have been under discussion. Yet each made its definite contribution to the totality of the achievement; among the business matters referred to, for instance, are the emphatically vital questions of disbursement, purchase, and accounting. Each was a necessary cog in the gears of the machine that was the Spruce Production Division.

Of prime importance among the incidental military matters to which reference has been made, is the Department of Intelligence. The Intelligence Office, as an office of the Portland District of the Western Department, was opened April 8, 1918, Captain George Gund in charge, acting under Washington orders. From the beginning, Captain Gund also acted in the capacity of Intelligence Officer for the Spruce Production Division, although it was not until September 3 that formal authorization was given by special order of the Division Adjutant. On September 23, Major F. S. Howes, of the Military Intelligence Division, and a former Colonel of the Massachusetts National Guard, took charge of the Intelligence Office, coming from Head-

quarters of the Western Department. Subsequently, Captain Gund was ordered to Washington, and left Portland on November 5.

The Intelligence Office acted, therefore, in the two-fold capacity of Division Intelligence Office and Intelligence Office of the Portland District. Among its duties were the collection and collation of military information, the supervision of posts, stations and camps, within the District; especially the detection and prevention of disloyal activity among the military forces, including the civilian personnel under military authority; and the direction of counter-espionage work. The officers and men of the Department also rendered invaluable assistance in curing the labor situation of some of its major ills, running down I. W. W. and other agents and influences calculated to stir up unrest and strife in the woods, and thus hamper the work of airplane production. In this respect, as well as in others, the work of the Intelligence officers made its distinctive contribution to the task the Division had particularly in hand.

Personnel

The same may be said of the work of the Division Personnel Adjutant, Captain Arthur Lee. The duties of this office are such as are set forth in Army Regulations—to handle all matters pertaining to War Risk Insurance; to maintain a card index system including all officers and enlisted men in the Division; to supervise the quarterly rating of all officers; and to establish a system of qualification cards to cover the entire personnel. The last named branch of the office's activities was particularly valuable in a Division engaged in such an enterprise as this Division was, with its constant demand for a wide variety of special talent. Almost daily, experienced men were required as hook-tenders, cruisers, buckers, high-climbers, tree-spotters, fallers, surveyors, truck-drivers, machinists, engineers, brakemen, accountants, stenographers, and kindred lines of endeavor. Practically every man in the Division was assigned to the work for which he was best fitted, and, consequently, that in which he could be most efficient, by reference to the qualification cards.

A third matter was the work of military inspection, which was begun in mid-February of 1918. Captain O. M. Massey, afterward Assistant Chief of Staff, was detailed for Inspection and Inventory of Division property. On July 11, Captain F. L. Gerlach was appointed Division Inspector for matters other than property, and a week later relieved Captain Massey of Inspection and Inventory, being himself relieved of general inspection by the appointment of Captain B. E. Barker to that work. At the end of October, Captain Gerlach became assistant to the Division Adjutant, Captain C. W. Latimer assuming his duties. A few days later Captain C. L. Pitney became assistant to Captain Barker on general inspection.

Still another military angle was the work carried on by the Division Ordnance Office. Although the Spruce Production Division was not a fight-

ing organization in the ordinary military sense of the word, there still remained considerable routine detail in issuing and caring for the arms and equipment used by the men. The work of the office was originally under the Division Supply Officer, but on February 13, 1918, the office became independent, with Lieutenant L. C. Campbell in charge.

Some Problems of Business

Incident to the commercial affairs in which the Division found itself involved, rose certain problems covering the necessary business transactions. Money must needs be disbursed; purchases must be made; supplies must be found and furnished; proper vouchers must be accomplished; and a vast machinery of accounts must be built up.

A disbursing officer, Captain James Van D. Crisp, arrived in Portland on October 28, 1917, representing the Finance Department of the Equipment Division of the Signal Corps, with instructions, first of all, to secure contracts with mills producing aero lumber, and to reimburse the mills for the product furnished. An immediate difficulty presented itself from the fact that a number of the mills had outstanding invoices, over two months old, and some of them were in desperate straits for funds. Worst of all, no records seemed to be available to show which shipments had been paid for and which had not. Vouchers, which had been forwarded to Washington, were either lost or mislaid.

But though the Disbursing Officer got away to a very poor start, matters shortly assumed a more happy aspect. By dint of a good deal of tedious labor, accurate records finally were compiled, concerning the shipments referred to, and authority procured for issuing duplicate vouchers, to take the places of those which had been lost. The mills were given fuller instructions as touching the forwarding of the proper supporting papers, and a system whipped into shape whereby payments were made the same day that shipments were certified to have passed inspection.

Many supplies other than aircraft lumber were, however, necessary to carry on the work of production. The chief difficulty encountered here lay in the fact that creditors in the Northwest had had little experience in rendering invoices for supplies sold to the Government, and little conception of the detail required on Government accounts. Invoices were received in such shape that it was often necessary to have them re-written in their entirety.

This vouchering problem became so menacing that, in February, it was turned over to the Purchasing Department, and, on April 26, it was necessary to create a Voucher Section, to which were turned over some 1,400 old orders and vouchers. The establishment of the Voucher Section solved an aggravating and perplexing problem. The additional personnel relieved the Purchasing and Disbursing offices, and the new Section was enabled to co-ordinate

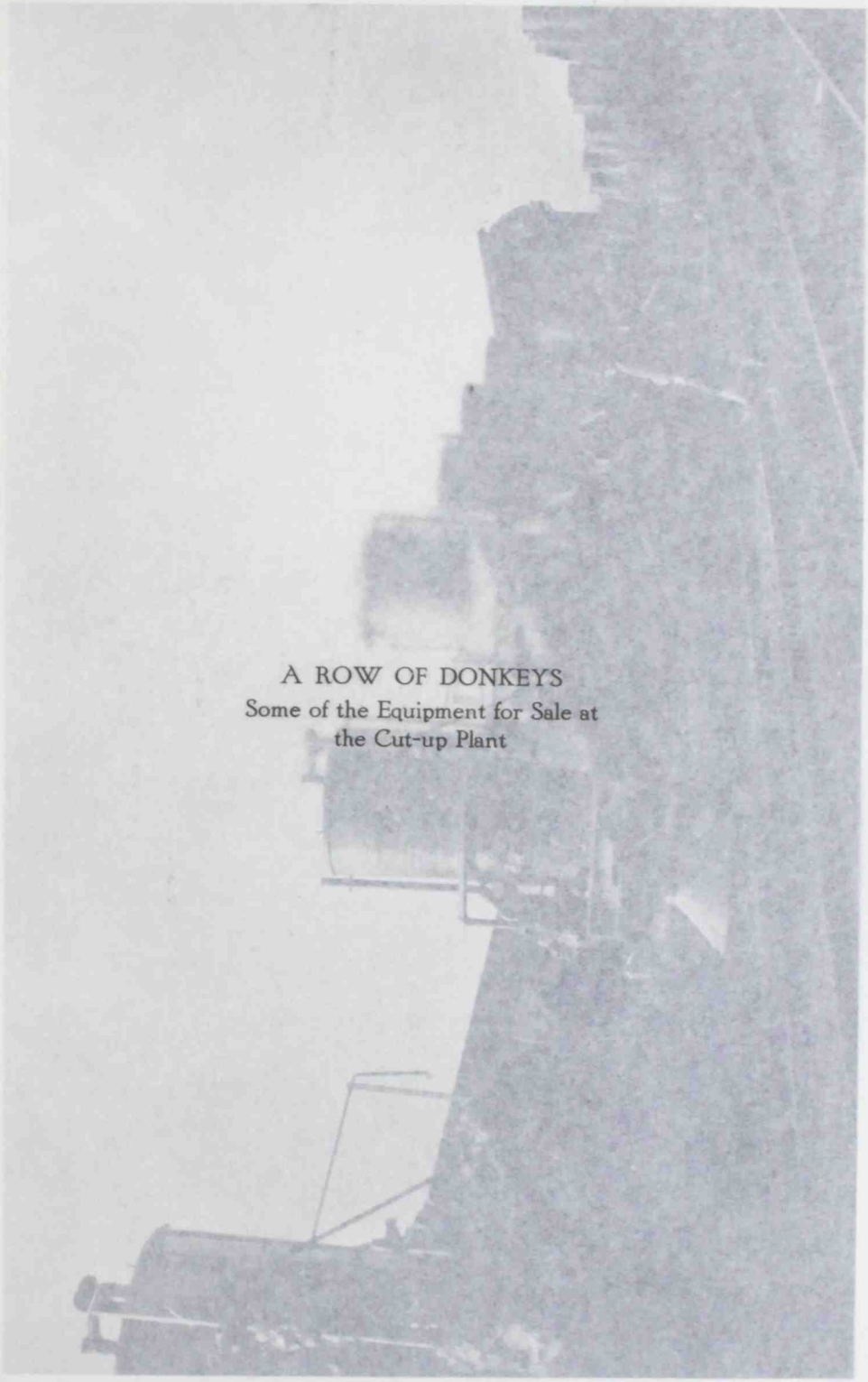
the work of all branches. This, in addition to educating the Government creditors to a correct rendering of accounts, shortly produced order out of chaos. The business rose to a great volume, reports of the Voucher Section from week to week showing an average of 600 vouchers in process of accomplishment at all times. Since two weeks was the average time required for the accomplishment of vouchers, the permanent notation of 600 unaccomplished vouchers was correct, and a demonstration that the Section had cleaned up old work, and was keeping even with new.

An interesting phase of the work of the Disbursing Section was the matter of advances of credit to certain operators. It was quite apparent from the outset, that new tracts of timber must be opened up, and that new equipment would be required. To facilitate this extension of operations, it was necessary that Government funds be made available, as money was scarce in the Northwest, and the bankers loath to make advances on the security which the individual operator was able to offer. Authority was therefore granted by the War Credits Board to loan Government money, and several large advances were made. As a precautionary measure against loaning to persons of inadequate financial standing, the Disbursing Officer organized an advisory committee of representatives of the five leading banks of Portland. In addition to financial standing, investigation was also made of the operator's ability successfully to fulfill the contract for airplane material. Every possible safeguard to protect the Government's interest was therefore taken, and this factor in production worked out very successfully.

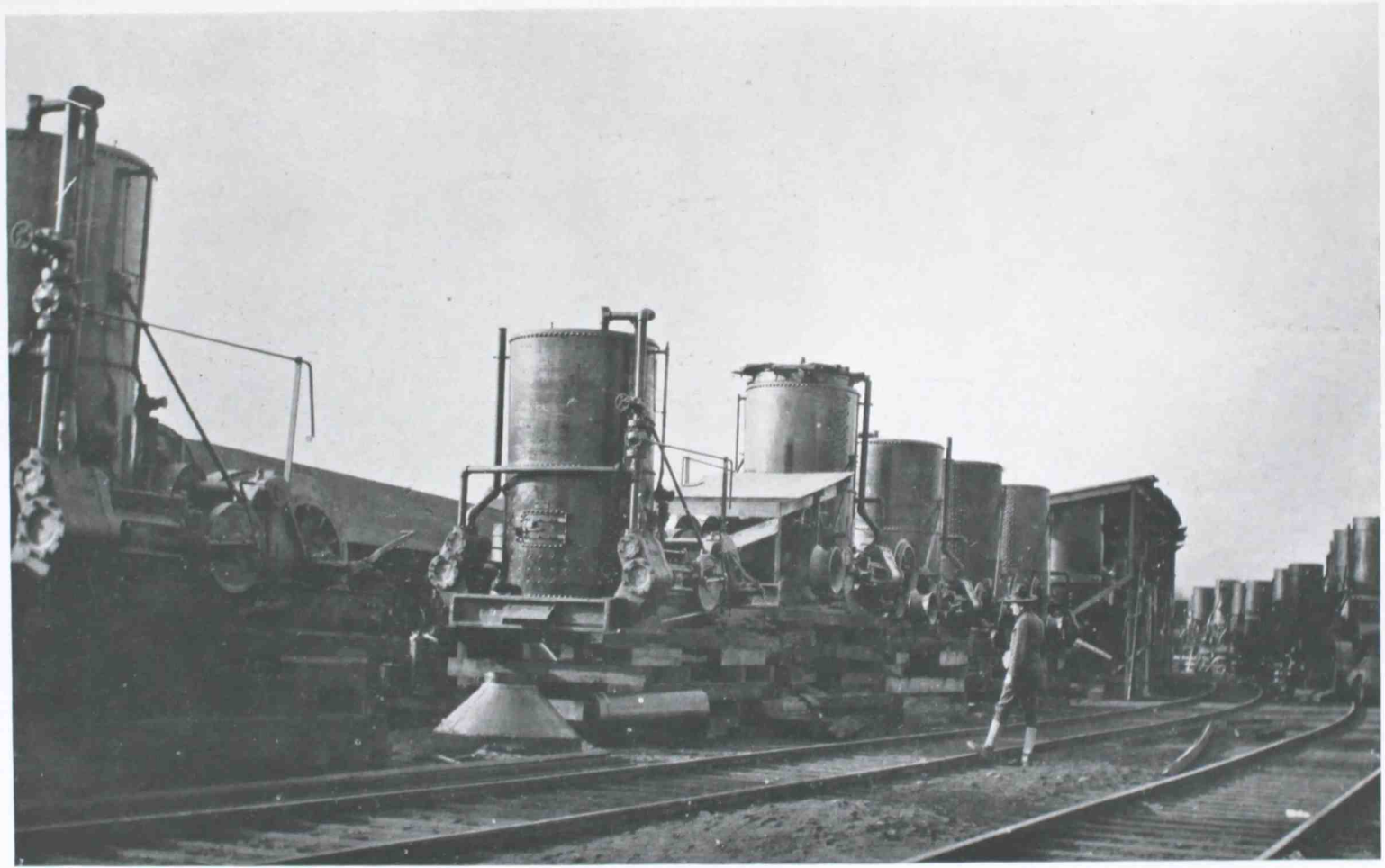
The Purchasing Department, twin of the Disbursing Section, also encountered its difficulties. The business of this branch averaged about twenty-two orders each day, and the total expenditures ran well up into the millions. The big problem of buying for the Cut-up Plant and dry-kilns, and for cost-plus contracts, fell upon this office, although in the latter matter it was assisted, after February 1, by the creation of a Supply Section for Cost-plus Contracts. Efforts were made to get material at the lowest possible figure, and the Purchasing Officer was finally able to stop the placing of orders except by his office, thus getting the advantage of competitive bidding.

Property Accountability

The question of responsibility and accountability for the large and valuable properties which the Division rapidly accumulated, soon became a vital one. Originally, property bought by the Division was placed in charge of two officers, one designated as Property Officer of the Cut-up Plant, and the other as Division Signal Officer. Property procured by the Division through the purchases of its contractors was accounted for by a property officer stationed with each contractor. As the operations of the Division were extended, other property officers were designated to become accountable for property used in the particular operation with which they were connected. Under this system the property of the Division was never segregated under one accountable head.



A ROW OF DONKEYS
Some of the Equipment for Sale at
the Cut-up Plant



When, however, the United States Spruce Production Corporation was formed it was decided that there must be one officer accountable for all property; and further, that in all operations where it was necessary to place property officers, such officers should be responsible to this one accountable officer. In pursuance of this policy, Captain David J. Witmer was named General Property Officer in August, 1918; and all property of the Division, both that purchased by it, and that transferred to it by the Signal Corps was, by order of the Secretary of War, transferred to the Corporation. This placed all property matters in the hands of Captain Witmer as General Property Officer. Captain Witmer maintained headquarters at Portland, with assistant property officers stationed in the headquarters of each contractor, and of each operating district. An assistant officer was also placed at the Cut-up Plant, and one at the Toledo sawmill, while Captain Guy M. Arnold, as Division Property Officer was stationed at Vancouver Barracks.

The responsibility and accountability of these officers constituted no small item. The property assets of the Corporation amounted to approximately $24,000,000.00 at the time the armistice was signed, representing all classes of supplies and equipment. Promptly upon the halt of operations, the work of inventorying this property in the field began. Contractors and assistant property officers were relieved, and the property shipped to authorized storage centers at Vancouver, Portland and Seattle, the Property Department also handling the matter of shipping out such items as were sold.

Keeping the Accounts

Accounting was another problem which rapidly assumed prodigious proportions. The Accounting Section was organized in January, 1918, at a time when one of the big rived spruce contracts had already been entered into, and when the Cut-up Plant was far on its way to completion. These two items presented the first problems, as nothing had been done from an accounting standpoint. The work had to be accomplished quickly for the operations were already under way. Before it was completed, two more rived spruce contracts were entered into; each of the three contracts calling for a production of 100,000,000 feet of rived cants within eighteen months, and an approximate expenditure of some $13,000,000.

The Accounting Section quickly determined upon the policy of a uniform system of accounting for all contracts and contractors, and such a system was devised, installed, and operated with marked success. To Lieutenant (later Captain) William J. Conniff belongs the credit for this accounting system; he not only originated it, and put it into effect, but continued to manage its operation as well. At the outset this officer was assisted by only two Lieutenants, but the corps grew rapidly until it numbered eight officers, with half a hundred enlisted men, together with about 300 accountants, camp clerks, bookkeepers and timekeepers, employed by the various contractors and plants, all of whom were under the supervision of the Section.

Perpetual audit of all disbursements made by the concerns under supervision, and of all journal entries and ledger postings was maintained. This was done because the operations were being carried forward on a cost-plus seven per cent. basis. Keeping abreast of the physical facts of the various operations in itself was a great obstacle, since even daily changes occurred. The work of the Section was never allowed to approach anything like a routine basis. The magnitude of the operations expanded almost by arithmetical progression, the Section anticipating the requirements by an expansion of the accounting force with competent men. This was done by locating good accountants of draft age, and persuading them to get induction into the service with the Spruce Production Division, where they were placed in an accounting school maintained for the purpose, and in which they received instruction in the especial peculiarities of the Division's work. This foresighted policy was another of Captain Conniff's devices. If some such course had not been followed, the Section shortly would have found itself marooned upon a desert island of absolute helplessness. This will readily be seen when it is noted that the Section has been called upon to supply as many as ten men in one day as camp clerks and timekeepers.

Strictly up-to-date methods of accounting and cost determination were applied by the Section to all the work under its supervision. The exact manner of keeping accounts was prescribed, as was also the basis of the computation of costs, a uniform system obtaining throughout. In the rfving and logging camps, costs were determined by camps, thus making possible cost comparisons, and the estoppel of operations in camps where costs were prohibitive. A pamphlet was prepared on accounting and cost-computation under cost-plus contracts for the production of logs and cants for airplane material, comprehending also the construction of railroads on a cost-plus basis, and furnished to those interested. An important administrative duty of the Section was to act as advisor and counsellor to the accounting departments of the various contractors, which departments dealt, to a large degree, with the same problems the Section had encountered. The Section thus acted as a sort of tribunal before which all accounting problems arising in the Division were brought for adjudication and solution.

Accounting control and general supervision was exercised over general accounts and costs of the Spruce Production Division; over the Cut-up Plant, and other Government mills at Toledo and Port Angeles; over the great rived spruce and logging contracts entered into with four different firms; over the Division railroads; over the Oregon Planing Mill Association, composed of three units engaged in the manufacture of finished airplane parts, on a cost-plus basis; over a miscellany of companies producing spruce and fir logs, on cost-plus contract; and over the ledger accounts of the Disbursing Officer of the Division.

After the formation of the Spruce Corporation, the work of purchase, disbursement, accounting and supply was reorganized, and the Disbursing Section became identical with the office of the Comptroller of the Corporation,

Major C. C. Campbell being in charge. The Accounting Section was made identical with the office of Treasurer of the Corporation, Major Campbell being in charge, with Captain W. W. Bleakley as assistant, Mr. R. W. Moore having resigned as Comptroller and Treasurer. These two offices, together with the work of vouchering and property accountability, employed a personnel of twenty-two officers and 106 enlisted men. The Supply Section and the Purchasing Department were merged under one administrative head, Major R. S. Eskridge being in charge as Division Supply Officer.

Selling the Side-Cut

The Spruce Production Division as a commercial and industrial, as well as military organization, was a polygonal institution; it had many sides and many angles. One of the interesting ramifications developed when the operations at the Cut-up Plant began to pile up millions of feet of side-cut lumber, of no use in the construction of airplane parts, but much too valuable to be thrown away, or relegated to the woodpile. To take care of this constantly augmented accumulation, the Division Liaison Officer at Washington, Major Leadbetter, was appealed to. Major Leadbetter's efforts were crowned with considerable success, one order for 5,000,000 feet for airplane cratings being secured. But it became apparent that a more thorough method was necessary, and a Commercial Sales Department was organized July 20, 1918, about three months after the Plant began its operation, the duty of which was to dispose of the side-cut accumulated and to come; and also that produced from the manufacture of aero lumber at the Monarch Mills in North Portland, and at the Hammond Lumber Company's mill at Warrenton, Oregon.

Lieutenant (later Captain) Thor W. Sanborn was selected to take charge of this department; a man who, for sixteen years, had been handling spruce in the eastern territory for the Pacific coast mills. Lieutenant A. D. McDonald was detailed as his chief assistant; and on December 7, 1918, the latter officer assumed charge of the department, when Captain Sanborn left the Division.

Several more or less disturbing factors faced the Department of Sales, on its inception. Imprimis, the character of the accumulating stock limited the marketing facilities by cutting out the yard trade demand, and dictated that the market be sought chiefly among the factories. Western spruce was, from the general commercial viewpoint, comparatively unknown, in the East, so that considerable exploitation had to be undertaken. Moreover, the Government was frowning upon, or else positively forbidding general building operations, and this still further delimited the market to essential industries and Government business. Finally, it was desirable to sell this side-cut without interfering in any way with the sales of the normal spruce and fir industry of the Northwest.

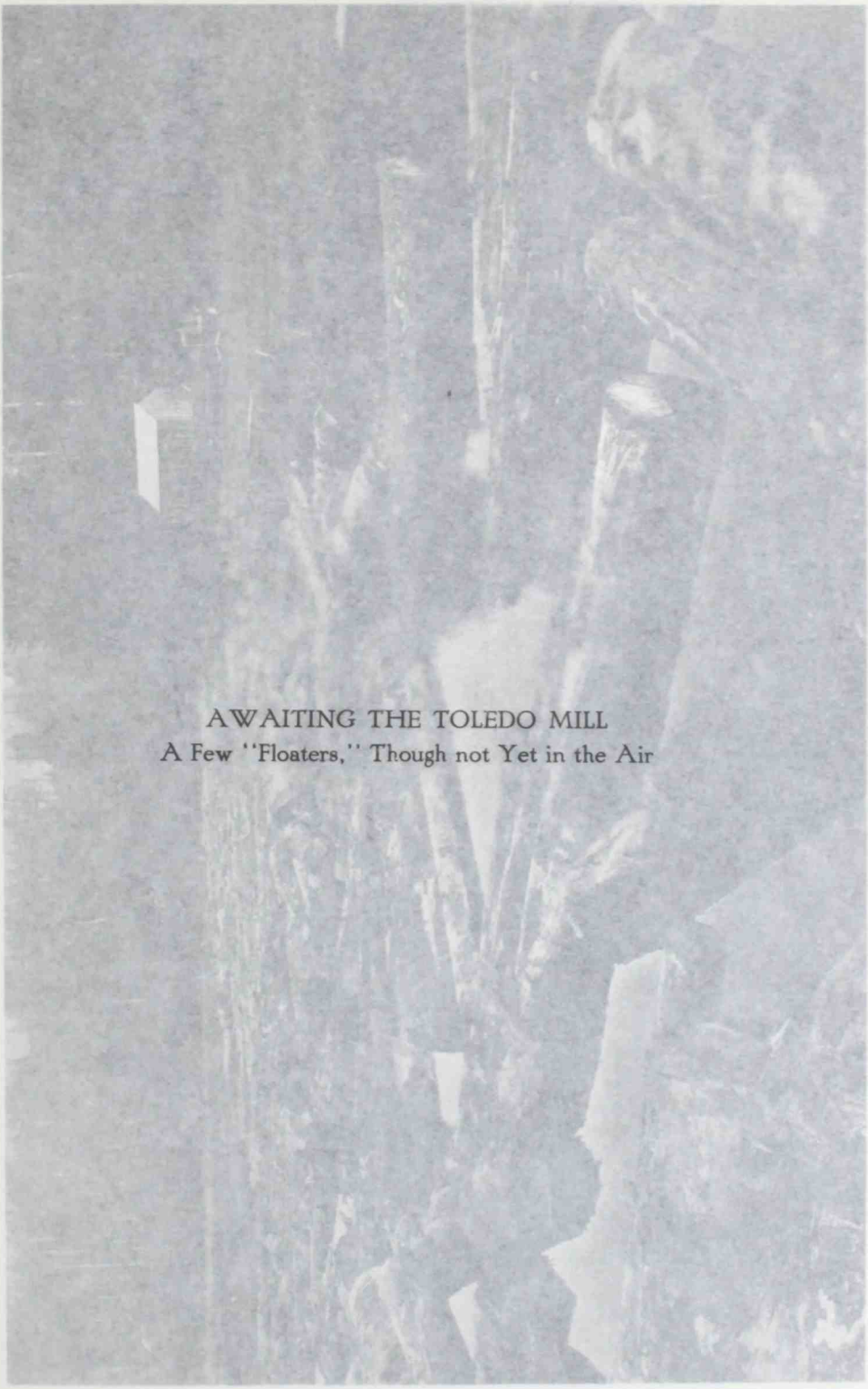
With these limitations in mind, the Sales Department set to work. The large wholesale lumber dealers were circularized, and industrial concerns were

solicited. Under authority from Washington, salesmen were placed in various territories throughout the United States, and during the fall and winter of 1918, worked out of Philadelphia, Boston, Buffalo, Detroit, Chicago, Minneapolis, Omaha, Seattle, Portland and San Francisco; and subsequently out of St. Louis, Cleveland and Kansas City.

The effectiveness of the sales force was at once felt. Within sixty days a demand had been built up practically equal to the volume of side-cut; sometimes the demand was even a trifle ahead of production. Sitka spruce, little known in the East, was going into many factories that formerly used poplar, basswood, and eastern spruce, for the manufacture of all sorts of articles for the home, for the farm, and for various industries. Up to the end of 1918, 33,213,537 feet of spruce, fir and Port Orford cedar had been disposed of, besides 282 carloads of fuel cordwood, and seventy-one carloads of spruce pulpwood, the cordwood being sold for the most part in the cities of Vancouver and Portland. Commercial lumber was frequently produced at the Cut-Up Plant at the rate of 300,000 feet per day, until November 11, 1918, and thereafter in decreasing volume until the final sawing on December 11, the total side-cut of commercial lumber approximating 50,000,000 feet. At the close of the year only 16,000,000 feet remained unsold of this entire output. This amount was turned over to the Sales Board, created after the armistice was signed for the disposal of all the Corporation's property, and on January 28, 1919, the entire commercial cut, including that from outside mills, was cleaned up *en bloc*, the Government receiving the excellent price of $18.10 per M for the lumber just as it stood in the yard.

How was it done? What magic was employed? It was not accomplished by an undervaluation of the lumber, which commanded an average price of $35.00 per M, f. o. b. Portland. This figure it may be noted in passing, does not represent a net valuation to the Government, since a cost of $9.00 was involved in milling and hauling. Nor was the trick turned because spruce presents any overwhelming advantages over the woods which it in part displaced, except that, as the acknowledged leader in the field of airplane construction, it bore a justified reputation as the strongest wood known in proportion to weight.

The long experience of Captain Sanborn in the west coast lumber game was undoubtedly a vital element in the fine record of the department. And to this leadership was coupled an efficient sales force in the field. A potent factor in selling a large quantity of the material in what was virtually a single stroke, was the success of the sales organization in procuring a change in the Government Railway Administration's specifications in favor of the inclusion of spruce, in the construction of freight cars. Seven million feet of airplane side-cut went into the floors, siding, and roofs of cars; nearly a quarter of the entire sales. But, chiefly, the achievement was made possible by the sure-fire magic of hard work, and perpetual pounding away at the task. Like the other accomplishments of the Division, it was done because it had to be done. Necessity is not only the mother of invention; but also the ancestor of applied energy and the parent of perspiration.



AWAITING THE TOLEDO MILL

A Few "Floaters," Though not Yet in the Air

CHAPTER XII

The Problem of Letting Go

T THE eleventh hour of the eleventh day of the eleventh month of the year of grace 1918, the echoes of the shot that Prinzip, the Serbian student, fired on that far-off day of June ceased to reverberate, and the Hun acknowledged the most humiliating instrument to which a first class power has ever been a signatory. The defeated legions of Paul von Hindenburg were barely saved from utter rout; the morale of the German nation broke down; and the Hohenzollern empire crashed to the ground. The signing of the armistice promptly effected a sudden solution of the problems with which the Spruce Production Division had been wrestling; but it introduced the new problem of "letting go." The purpose for which the Division and the Corporation had been organized saw its accomplishment in the collapse of the Hun machine; and steps immediately were taken looking toward the demobilization of the one, and the dissolution of the other.

The falling of trees in the woods on all government operations ceased on November 12, 1918, in compliance with telegraphic instructions from the Commanding General. Construction and development on such operations were also ordered stopped, except that on Division Railroads Numbers I, XI, and XII, and on the Toledo mill. Immediate steps were taken to cancel all contracts according to their terms.

Production being thus arrested at its source, there remained the necessity of dealing with the product already in process from tree to finished airplane part. The halt of operations found much material in each of the several stages of production, and a program for handling was outlined in "General Orders No. 34" dated November 22. Trees had already been felled, and where it was commercially justifiable, such trees were bucked, yarded, hauled to water, rafted and held for sale. Mills which found themselves with a stock of cants manufactured for Government purposes were permitted to ship the same to the Cut-up Plant at the war-time prices. The Division Railroads, with the exception of those which had been permanently built, were ordered torn

up, and the equipment, rails, ties and the like, concentrated at the terminal, painted and greased to prevent deterioration, inventoried, and a report made to headquarters.

Officers and men remained on duty at their several stations, until they were no longer required for logging or construction work, at which time they were brought in gradually to the Division depot at Vancouver Barracks for discharge or transfer. As long as the men were actually engaged in logging work, they continued to receive civilian pay, after which, and until entrained for Vancouver, they were given extra-duty pay at the rate of $1.50 a day, including Sundays and holidays. This extra-duty pay was an allowance for clothing and rations in addition to the Government allowance. The men were utilized for policing camps, assembling tools and equipment, cleaning up debris, and similar work. From the date of entrainment the men reverted to ordinary soldier pay and allowances.

Winding Up

Four boards were created to take care of the various details incident to the close of operations. One was designated the Contract Board, it being the duty of this board to secure the cancellation of all commitments and contracts; a task demanding a good deal in the way of diplomacy and tact. Major F. D. Eaman was named as president of this board, with Lieutenant-Colonel G. E. Breece, Major E. G. Griggs, and Captain C. Squires as members. For the period December first to thirtieth, Captain H. C. McIntosh served on the board, owing to the absence of Colonel Breece on leave. Colonel Breece was relieved of duty with this board on January 14, 1919. A second board was appointed to consummate the sale of properties of the Division, of whatever nature, and was designated the Sales Board. Lieutenant-Colonel Hitchcock was named president, with Major W. Eastman, Captain I. D. Wolf and Lieutenant J. E. Montgomery as members. On January 6, the personnel was changed by making Major Eastman president of the board and adding Captain H. C. Eustis and Lieutenant L. P. Pink, Colonel Hitchcock and Lieutenant Montgomery being relieved. In February Major Lenihan took Captain Eustis' place. To supply this board with accurate data, and to furnish prospective purchasers with information, a Catalog Board was appointed consisting of Major W. A. Welch as president, and Major R. S. Eskridge, Major George B. Herington, and Lieutenant K. A. Burnell as members. Lieutenant Burnell was relieved in January, Captain Allen Curtis taking his place. To the Catalog Board fell the duty of inventory of the Corporation's property, and concentrating it all at storage points, with the exception of logs and lumber. Five hundred copies of the catalog were ordered to be prepared and printed, with unit maps and a key-map, showing the realty and timber holdings of the Corporation. Finally a board was named to investigate the extent of fire hazard caused by the operations of the Division, and to recommend means of elimination, in pursuance of the principle that the Division should leave the forests as safe from fire risk as it found them. This board consisted of Captain J. H. Markham, Captain W. D. Clark, and Lieutenant J. H. Smith.

The program for the demobilization of material having been worked out and set forth, the next step was the demobilization of the officers and men themselves. At General Disque's suggestion, War Department orders marked the Spruce Production Division as one of the first units to be mustered out.

Work began on December 3, when ninety-four men were examined. On December 6 the first men were discharged from the Division, almost exactly one year after the first men reported to the Division. The work of demobilization was shortly speeded up until it averaged 500 transfers and 500 discharges a day, the movement being checked somewhat from time to time by reason of the fact that some men were still required to carry on the necessary work entailed by the handling of properties and supplies.

To carry forward the demobilization of the Division required the services of four officers and 100 enlisted men of the Adjutant General's Department, assisted by officers and enlisted men of the Division, assigned to the detail. Medical examinations were in charge of Captain Elliott, M. R. C., attached to the Division. By the first week in February, the work was practically complete, a few officers and men being retained to conclude the Division's labors.

What About the Loyal Legion?

Another problem in connection with the disintegration of the activities of the military in the Northwest takes us back in thought to one of the perplexing questions that first faced General Disque when he began to organize for greater spruce production. Labor unrest had necessitated the creation of a new war organization among the lumbermen of the Northwest, and the Loyal Legion of Loggers and Lumbermen had been formed. Now, what was to be done with the Loyal Legion? This was the query that began to go round and round the circle of those interested, millmen and loggers, operators and workmen, civilians and soldiers. Would it drop out of existence as a matter of course? It was formed as a purely war organization; but many who had felt the beneficial effects of the laboring man and his employer getting together on a common basis for the common good, began to wonder if it could not be continued on a new basis, as a peace organization. The appeal for continuation came from both operators and operatives, and in order that the organization might be given an opportunity to determine its own future, a bulletin was issued under date of November 26, calling conventions of the Legion for December 6, and December 9, at Portland and Spokane respectively, and with instructions to take a referendum vote on the question: "Shall the Loyal Legion of Loggers and Lumbermen be continued as a peace organization?"

The result of this referendum, with the corroborating action of the twin conventions, was the voting of an overwhelming majority of the membership in favor of continuation. The conventions went on record as endorsing the general policy and program of the Legion as it had been exhibited during the year of its existence. Tumultuously they endorsed General Disque. They chose a committee of twelve employers and twelve employees to be their gov-

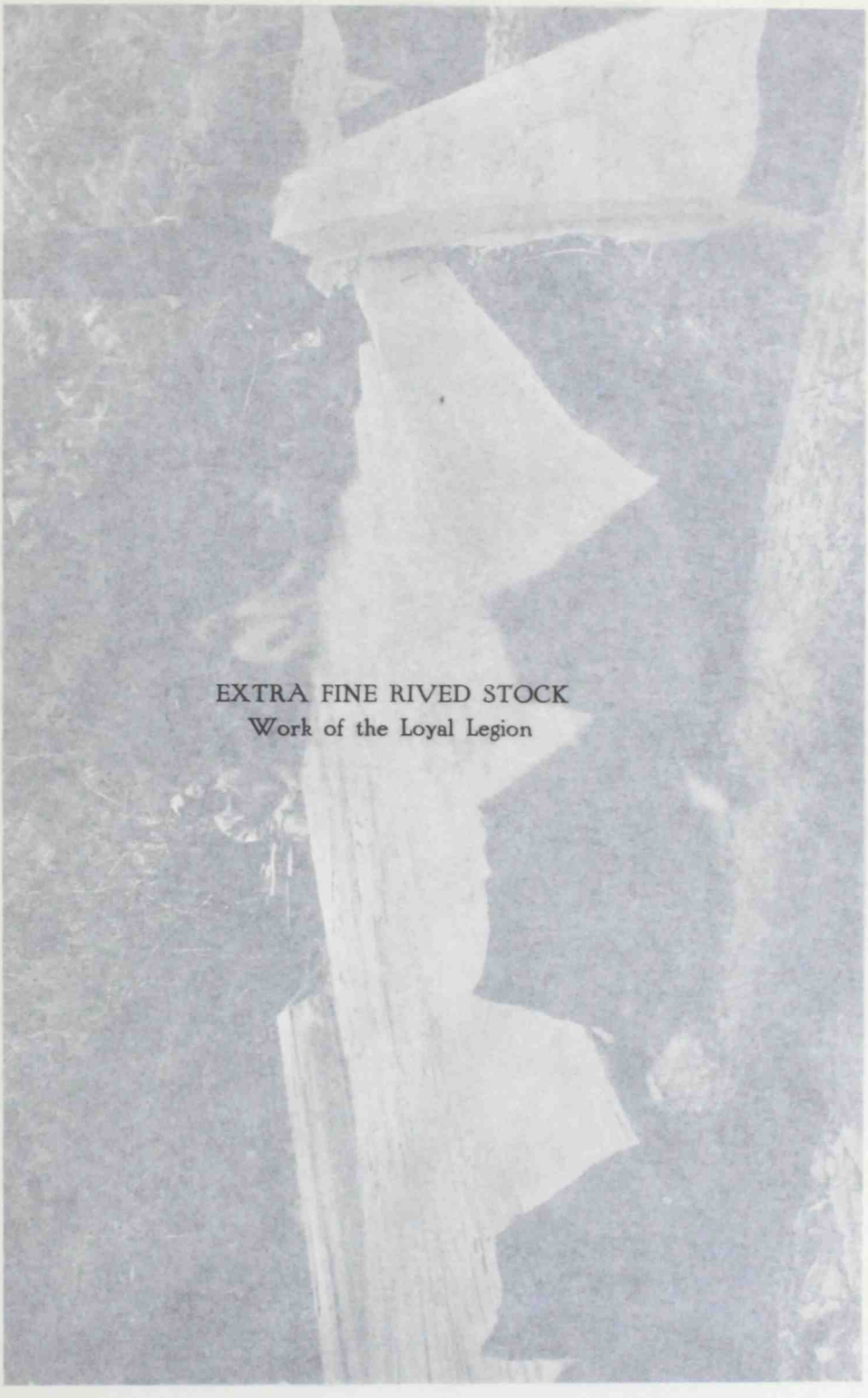
erning board, and to draw up a constitution and by-laws. To help this committee in its work, a variety of suggestive resolutions were introduced and passed, indicating in broad outline the main policies of the organization.

Meeting during the week following January 6, 1919, this committee drew up and perfected an instrument to guide and govern the new Loyal Legion, preserving the general lines of the old, as touching the details and machinery of administration, and making the changes in language necessitated by the new status. As the objects of the organization, the constitution sets forth fifteen specific aims. The first of these is the maintenance of the basic eight-hour day. Another demands a just wage for the worker and full efficiency for the employer. They take up the relations between the employer and employee, insisting upon the "square deal," and urging closer relationship, both industrial and personal, between operator and workmen. Questions of welfare take up six of the fifteen points. And the Legion in the last of them, asserts its loyalty to the United States, its laws and government, and demands a proper respect for its flag.

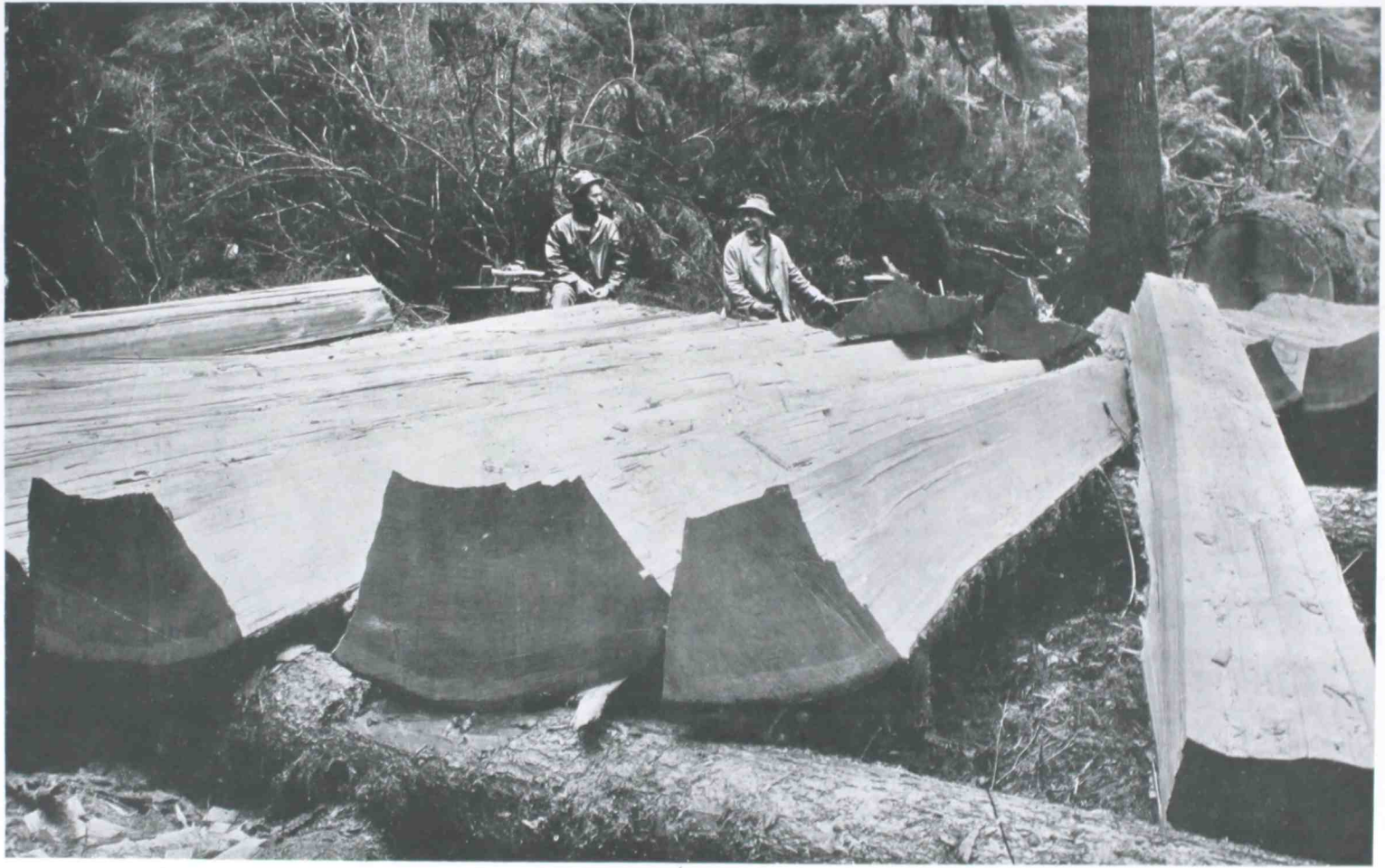
The fundamental principles of the new Loyal Legion are therefore seen to be three: co-operation, and a fifty-fifty partnership as between employer and employee, on the basis of strict equity; efficiency, including an efficient wage and an efficient day's work; and a thorough-going Americanism. All three of these fundamentals are stressed in the membership pledge which each applicant must sign and swear to. The pledge binds the member to stamp out anarchy and sabotage. The loyal Americanism is protected by regulations which do not permit anyone to become a member who, being eligible to citizenship has not become a citizen, or legally declared his intention to become one; and which prohibit anyone who evaded military service during the war, on the ground of nationality, from ever becoming a member. In addition to signing the pledge the operator must deposit a bond, the entire amount of which is forfeitable in the event of his failing to live up to the regulations or to pay any penalty the governing Board of Directors (successor to the old Central Council) may impose.

Officers, to be elected by the Board of Directors, are a president, a secretary-manager, general treasurer, lyceum officer, industrial chaplain and sanitary inspector. There are also provided district managers or field representatives of the president. General Disque, being invited to assume the presidency, agreed to do so, without salary, as long as he should remain in the Northwest as head of the United States Spruce Production Corporation. Major P. L. Abbey was retained as secretary-manager, Captain E. D. Birkholz as manager of the Inland Empire Division, and Major T. A. Mills as lyceum officer, these officers resigning their army commissions to accept appointment. The Monthly Bulletin was also retained as the official organ of the Legion, with (formerly) Lieutenant Robert S. Gill as editor.

The two leading lumber associations representing perhaps ninety percent. of the production of the Northwest, promptly endorsed the new movement for industrial peace, and locals rapidly reorganized on a peace basis. It is too early to determine what the outcome of so unique an experiment in indus-



EXTRA FINE RIVED STOCK
Work of the Loyal Legion



trial relations may be, but even the fact that such an attempt could be made at all has its deep and splendid significance. That fact in itself is a testimonial to the work of the Division and its leaders in the forests of Oregon, Washington and Idaho.

The Division Property

The magnitude of the spruce operation as a whole can readily be gauged by a consideration of the vast properties which the Corporation possessed at the end of hostilities. November 11, 1918, the greatest day in modern history, found the United States Spruce Production Corporation a going concern, which as such was just acquiring a terrific momentum. Its peak of effectiveness would have been reached about six months after the armistice happily tripped up its steady progress. The result was that the Corporation found itself with some $24,000,000.00 expended, or obligated for capital expenditures. To make a salvage of every possible cent was the task to which the leaders of the organization turned. It was no simple one. The Corporation owned everything in the line of lumber from a box of toothpicks to a thirteen-thousand acre timber tract. It owned everything in the line of equipment from a stove-bolt to a locomotive. In tangibility, this property ranged from real estate to a "scrap of paper." It owned a railroad or so, and it owned a can of tomatoes. It owned a saw-mill or so, and it owned a monkey-wrench. It owned large sections of scenery, and it owned cameras for making pictures thereof. It owned timber in the perpendicular, standing in the forests, and timber in the horizontal, lying in the yards or in the mill-ponds; timber that had been bucked into logs; logs in the water and on the decks of the mills. It owned logs partly squared, and it owned sawn cants. It owned airplane lumber, and it owned lumber cut to commercial sizes. And these properties were scattered far and wide, from Coos to Clallam, which geographical designations may be regarded as the Dan and Beersheba of the Division operations.

Real estate being the most tangible of all properties, we may begin with that. Foremost among the real property is the big Blodgett tract in the Alsea basin, tapped by Division Railroad Number XII, and comprising 13,440 acres of land, covered with spruce, hemlock, fir and cedar. Cruises made show a total of 786,101,000 feet of timber on the land; of which 32.5% is spruce, 25.5% is hemlock, 40% is fir, and 2% is Port Orford cedar. Besides the Blodgett tract the Corporation also owned the rights-of-way of four railroads. This property will run close to 600 acres in total extent, covering some ninety miles of right-of-way, and representing a valuation of approximately $100,000.00.

Sawmills and Railroads

In sawmills and resaw plants, the Corporation possessed a property representing some three million dollars. Five of these mills make up the total. One of these was the Cut-up plant at Vancouver, entirely completed—a twelve-

head resaw mill, which, with its battery of dry-kilns had cost some $825,000.00. The second mill was the giant one rising on the shore of Yaquina Bay at Toledo, Oregon; designed as a two headsaw mill, with a cut-up plant in connection, operating six cant saws. This saw mill was 70% completed at the time the armistice was signed; and the cut-up plant was completed and ready for the installation of the machinery. At Port Angeles, in Washington, a twin plant was under way, the sawmill also being within 30% of completion, but only the piling for the cut-up plant was in when operations were stopped. These two great plants represent something like three-quarters of a million dollars apiece. At Lake Pleasant it had been planned to erect still another sawmill and cut-up plant, with two headsaws, and four cant saws; the machinery had been purchased, and was *en route;* but on the signing of the armistice, it was diverted to Vancouver Barracks for storage. A small commercial mill at Lake Pleasant with one circular headsaw, used for construction purposes, completes the roll.

Four permanent railroads also belonged to the Division, two in Washington and two in Oregon, together with terminals and buildings and the necessary equipment for operating them, representing an expenditure of over $5,000,000.00. Besides these railroads, however, there were great quantities of railroad equipment that had come from the remaining Division roads, which had been built for temporary use only. Fourteen thousand tons of steel rail, eighteen locomotives, five locomotive cranes, 314 logging trucks, and 32 cars are among the items listed in the preliminary catalog of the Sales Board.

The railroads and the mills rank as the chief property assets of the Corporation. But aside from these, and in addition to logs, lumber and standing timber, the Corporation owned vast quantities of miscellaneous equipment, sawmill machinery, outfits for logging operations, and stores with a salvageable value of approximately $8,000,000.00. Four hundred donkey engines represent a good deal of money, with these engines at the figures they assumed during the war. They cost from $5,000 to $15,000 apiece, and their total can scarcely be less than $2,000,000.00. Three hundred and fifty automobiles and trucks, and some seventy trailers make a showing of $1,000,000.00 worth of motor equipment. Five motor launches were among the miscellaneous items, and several hundred electric motors. The Corporation also owned the Olympic Hotel at Port Angeles and about $120,000.00 worth of commissary stores.

So much for the equipment in items representing capital expenditure. There still remains the product left on hand, finished and in all stages of the process. About 4,000,000 feet of super-selected airplane stock, sawed to specification, and kiln-dried, ready for actual use was on hand at the Cut-up plant. Between 25,000,000 and 30,000,000 feet of commercial side-cut, also lay in the yards at Vancouver, at the Monarch mill in Portland, and at the Hammond mill in Warrenton, Oregon. The entire amount of this commercial side-cut was closed out in a single deal late in January.

One hundred and fifty million feet of logs were in various stages from the tree to the mill. Some of them lay in the dark recesses of the Clallam

county woods, miles from the railroad. Operations had gone forward in these remote spots so that when the railroad should be built in, there should be no delay, and the first cars in could carry back their burden of logs. Some of them on the other hand were lying in the mill races. Of this quantity about two-thirds was salvageable as logs, the remainder being held for sale as stumpage. It is difficult to estimate the value of such holdings.

Labors of the Catalog Board

To the work of assembling and listing these properties, the Catalog Board at once addressed itself. Instructions were sent to property officers, and cost-plus contractors, directing them to ship all machinery, tools, materials and supplies to Vancouver Barracks. All rails in the state of Washington were also assembled at Vancouver; those in Oregon were assembled in the Callan yard in Portland in order to save transportation charges across the Columbia River. A third storage yard was established at Seattle, since it was deemed possible to secure sale of considerable property at that city.

A tour of inspection made by the Board resulted in certain recommendations, which upon approval by General Disque, were carried into effect. An elaborate system of indexing and cross-indexing was devised and installed, all material being classified under twenty general heads. Collating cards were then made showing inventory and shipping numbers, the number of articles, the requisition and purchase numbers, together with the price, and value in percentage as compared to new. The cards also showed the warehouse in which the article was stored, and the section of the warehouse. The summary of the items was then consolidated on a catalog sheet, and turned over to the Sales Board for future reference and files. The data on the major equipment had progressed, by January 10, to a degree that made it possible to place the information in the hands of the Sales Board for the publication of a preliminary catalog.

Eight hundred soldiers were retained at Vancouver Barracks to segregate, store and list the material received from the various operations. These, as they were discharged from the service, were relieved by civilian labor. It may be noted that something over 1,300 carloads of material soon found their way into the storage yards at Portland, Vancouver and Seattle. The Catalog Board also prepared an elaborate report on Division properties, showing the possibility of utilizing them. The report describes the territory of each of the Division railroads, the timber tapped by each, what this timber is good for, the sawmills adjacent, and the water-power available in each district, with special reference to pulp- and paper-mill possibilities.

Claims Against the Division

To the Contract Board was given the task of assembling all claims against the Corporation, the adjustment of these claims, and the cancellation of some millions of dollars worth of contracts entered into by the Corporation. The

Board organized for business on November 22, 1918, and forthwith entered upon the first phase of its task. Formal notice of cancellation was sent by the Legal Department to all firms with whom contractual relations existed. In some few instances contracts were cancelled for cause, on account of non-performance by the contractor.

In addition to this step, a notice was prepared to be sent to every possible claimant against the Corporation, of whom any record was in existence, who might for any reason have a *bona fide* claim to file. The notice was sent to 1,315 different firms and individuals, most of whom were in the states of Washington and Oregon, but a few as far south as California and as far north as Alaska. December 5 was set as the date before which all claims must be filed.

Even before this date enough claims had been presented to warrant the Board in beginning its deliberations and conferences. Many claims, it was found, were based on so-called "moral obligation." After due consideration, and consultation with the Trustees of the Corporation, and upon instructions received from the Bureau of Aircraft Production, the Board limited itself to such definite contractual obligations as would be recognized in ordinary commercial business. Some of the largest amounts paid were made necessary by early contracts entered into by the Division for a definite footage of spruce lumber to be delivered during a period not to exceed eighteen months from the date of the contract; but in making adjustments, deficiencies in delivery prior to November 11 were not recognized. A few claims were based on shrinkage in value of logs on hand after the contract quantity had been fully furnished. Such claims were disallowed.

The Board did not recognize the loss of future profits as constituting a just claim, though in some instances it was agreed to absorb a certain loss entailed in the cancellation of the contract, namely, that equal to the benefit the contractor would have had in a completed contract. It speaks well for the claimants to record that in most cases in which they accepted amounts smaller than those asked for, the settlement was reached amicably and in good spirit. In a few cases, the claimant announced his unwillingness to accept the Board's adjustment, but in all such instances it was felt by the Board that the claimant was seeking a large war profit, and could never support his contention in a court of law.

A large number of claims, disallowed in their entirety, because of the non-existence of contract relations, were those of loggers, who, knowing the mills were being given eighteen-months' contracts began operations under the assumption that the Government would provide a market for their logs at Government prices, at any time within that period. Such a misunderstanding is not justified by the reading of bulletins issued on this subject, which specifically invite logging contracts, and by necessary inference, indicate that the Government would not recognize as binding, anything short of a written contract. Some loggers insisted that implied obligation to pay for all logs produced and unsold prior to November 11 was involved in the fact that the Government determined the price of logs and for a long time allocated

all spruce log rafts. But the practice of Government allocation was discontinued September 30, or six weeks prior to the signing of the armistice. Due notice was given of the fact, and loggers were notified that they must find their own purchasers.

Officers of the Division had sometimes assisted operators in the purchase of tracts for their operations; and the Government bucking inspectors had been active in the woods. Some claimants held that these facts constituted an obligation. The Board however, held that these were matters of assistance only, and in no sense a control of the loggers' operations. Some claimants also took the view that the general control of the logging and lumber industry constituted an obligation on the part of the Government to take the product, even if the need for the same had ceased to exist. The Board could not share this view, but pointed out that in the fact of Government regulation and control there existed an opportunity for the industry to benefit itself, which, by its observance of the regulations, it had done.

Salvaging the Nation's Millions

The Board wound up its labors with but four unadjusted claims, totaling $452,598.52. Eighty thousand dollars was tendered in payment of these claims but the offer was rejected by the claimants. Another entire class of claims was transferred from the Contract Board to an adjustment board especially created on January 9, 1919, to consider all matters in relation to the big contracts of the Siems, Carey-H. S. Kerbaugh Corporation, with whom the United States Spruce Production Corporation was party to a railroad contract, and to another for the delivery and purchase of spruce flitches, both on a cost-plus basis. With the exception of these, and of a few indefinite claims dependent upon scale, the Board had, by the first week in February, cleaned up its task.

The entire number of claims examined by the Board was 237; but of these, nine were filed in error, one was transferred to the Siems, Carey-Kerbaugh board, and one was withdrawn by the claimants, leaving a net remainder of 226 claims, in amount totaling $7,673,124.77. Fifty-nine of these claims were disallowed in their entirety and $1,528,366.55 thus saved. Eight claims were allowed in full, and seventy more were allowed in part, and a settlement reached. The total amount asked on these 150 claims was $3,589,581.48, and the amount allowed, $1,514,498.42, a salvage of $2,075,483.06.

The nine remaining claims were of a special nature, involving the purchase of materials undertaken by the Corporation. Two methods of settlement were employed; either by cash paymnt; or by permitting a completion of the order, and delivery of the material whenever the latter expedient was calculated to render the best return to the Corporation. These nine claims amounted to $2,027,823.42. They were settled by cash payments aggregating $192,863.00, and by completion of orders amounting to $1,100,085.96, a total of $1,292,948.96, and representing a salvage of $734,874.46.

The total amount paid therefore, stands at $2,807,047.38, which amount settled claims aggregating $7,145,771.45. There remained the unsettled claims—totaling $452,598.12; and the indefinite claims totaling $74,755.00. The work of the Board effected a saving of $4,338,724.07.

The adjustment board appointed January 9 to consider the claims rising out of the Siems, Carey-Kerbaugh contracts for the Clallam county operation consisted of Major Eaman as president, and Major Welch, Major Herington and Captain Wolf as members, with Captain Freeman as recorder. The appointing order specified that "this Board will act in cases of all claims, and liquidate all obligations which according to the terms of the contracts become obligations of the United States Spruce Production Corporation, or the Government, upon cancellation of these contracts."

Adjusting the Clallam Contracts

It will be remembered that the big Clallam contracts were executed in May and became effective June 8, 1918; one for building a railroad, and the other for the delivery of 250,000,000 feet of spruce flitches within eighteen months from the date of the contract, both to be accomplished on a cost-plus 7% basis. The work was begun forthwith and pushed rapidly toward completion, the plan contemplating the beginning of deliveries at the rate of 3,000,000 feet a day, in December, 1918. The stage of progress reached at the time of the halt of operations indicated beyond the shadow of a doubt, that the contract would have been executed and completed in the time specified, had not the armistice put an end to hostilities. Expenditures and commitments up to that stage reached an aggregate of $10,500,000.00.

Says the report of the adjustment board: "While the cost of this work may seem high as compared with pre-war prices of labor and material, when consideration is given to the fact that this work was carried on practically in a wilderness, and under the most adverse primitive conditions, and speed was a most vital factor, and that all chances of failure as to time had to be eliminated, we recommend as follows, these recommendations being subject however, to the conditions as outlined later in this report."

The board approved the broad general policies of the operation. It approved expenditures for the Port Angeles mill, including the site, and the acquisition of the Olympic Hotel at Port Angeles. It approved the purchase of machinery for the Lake Pleasant mill, and the establishment of camps for its construction, though expressing disapproval of negligence in failing to have reduced to writing a verbal agreement as touching the use of the site of the camp, which negligence on the part of the contractors necessitated settlement to the owners for use, trespass and damage. It approved the location of logging railroads and spurs, and the work done on them.

The contractors had begun logging operations in remote places, anticipating the arrival of the railroad, so that actual production might coincide with such arrival; this policy was approved. Salaries paid to executives were

approved with some exceptions; but the policy was adopted of paying no salaries, except those of the accounting staff, after January 31, 1919. The work of grading on the railroads, and the work on the logging contract was done by sub-contracts, and each of these had to be separately examined before approval.

No settlement was possible under these contracts, especially that for the spruce flitches, until a complete accounting of property and expenditures could be made by the Siems-Carey concern. The adjustment set forth a detailed plan or method by which it was hoped to reach settlement, going into the last detail of audit and accounting, and setting forth items on which the company should receive both reimbursement and the seven percent.; those for which only reimbursement should be made; and those on which neither reimbursement nor the seven per cent. should be allowed. Out of the ten and one-half millions of expenditures and commitments, the work of the board will probably effect a saving of a million and a half, or thereabouts. And there remains, of course, the salvage on the properties turned over by the Siems-Carey company to the Corporation.

Efforts of the Sales Board

The Board in whose care the sale of the Division properties was placed decided, since an inventory only of the major equipment was immediately possible, and in view of a declining market, to advertise a sale of the major equipment at sealed bid. The campaign was begun on January 15, and bids opened a month later. Extensive advertising was done in the newspapers and trade journals, and a preliminary catalog was issued. The result was satisfactory only in the number of bids received, these totaling 1,550, and covering at least 10,000 items. It may be noted in passing that this sale was the largest sale of Government property ever advertised, only the sale of the equipment from the Panama Canal excelling it in number of items and valuation. Few of the bids received were acceptable by reason of being too low. Not more than $200,000.00 worth of the entire property was disposed of through them.

However, in addition to these sales on sealed bid, the Board consummated the sale of the remaining side-cut of commercial lumber owned by the Corporation, realizing almost $500,000.00 thereon. Some $216,000.00 worth of movable assets were sold in various ways. The sale of logs was begun. Steps were taken to dispose of the stock of aero lumber on hand, and negotiations opened for the disposal of all commissary stores.

But the results of the attempted sale of major equipment made it clear that the accumulation was too great to be disposed of hastily and economically. New plans therefore had to be devised, and the Board recommended that the sale of all movable assets be placed in the hands of one or more reputable brokerage firms, engaged in a like active business, and with a business of sufficient volume and organization to make it possible for such firms to absorb large amounts in their usual routine. This plan was followed because it was

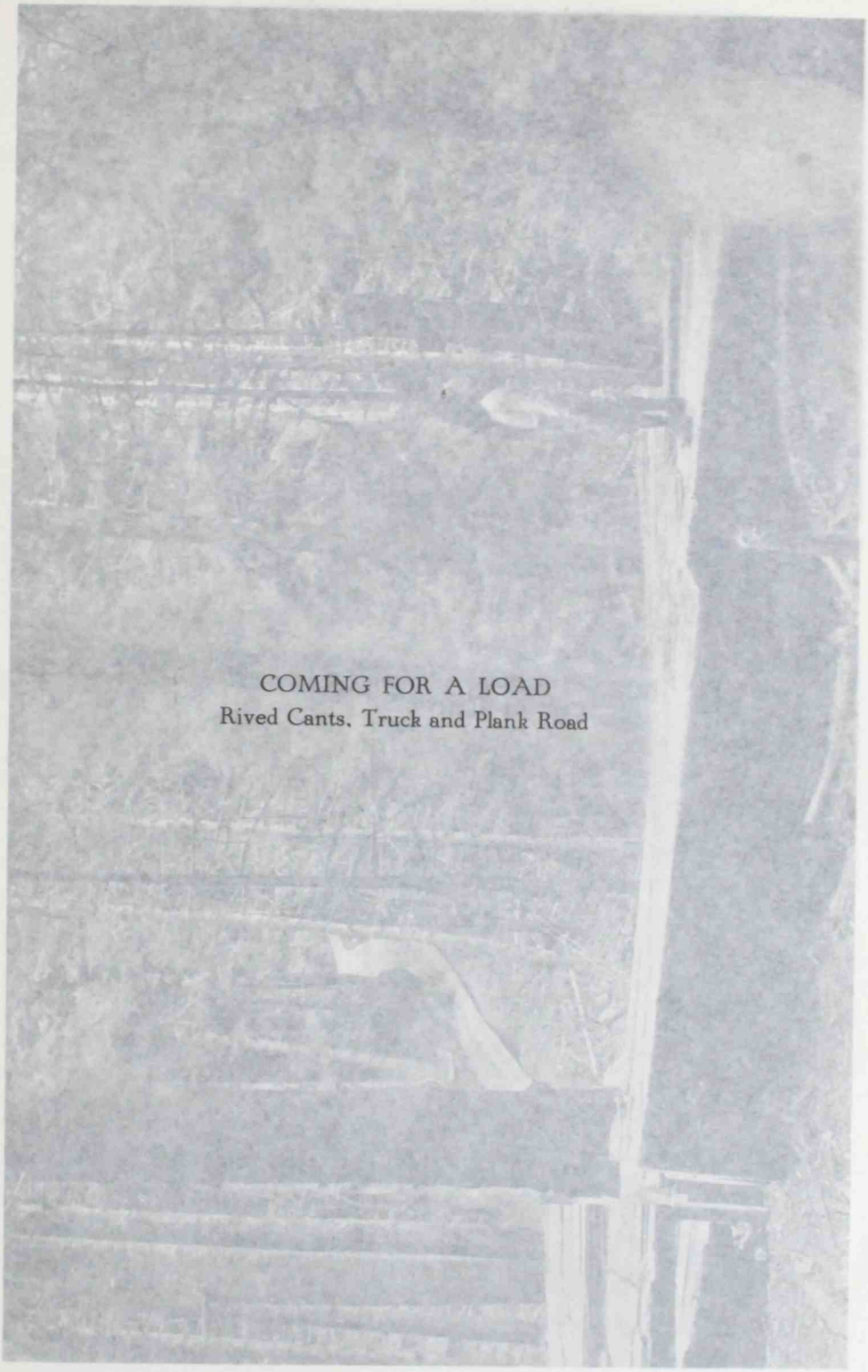
deemed inadvisable to attempt to organize a selling force, quickly and efficiently. As to the fixed and semi-permanent assets and properties, a similar procedure was approved, namely, to appraise the properties and offer them for sale through a selected list of brokers making a business of handling such properties.

As it became evident that an economical closing out of the properties would require perhaps a year or two, some plan of ultimate liquidation had to be evolved. One plan suggested was to turn all the properties over to the Quartermaster Corps of the Army. Another was the appointment of a receiver for the Corporation. Both these were, however, after due consideration, abandoned in favor of the Corporation continuing its existence for a length of time sufficient to liquidate its own assets.

Reorganization of the Corporation

To this end a reorganization was effected on February 8, 1919, grouping the various branches of the work under four heads. A new Engineering Department was created, under Major Herington. It included the old departments of Engineering, Government Operations, Logging, Railways, the Catalog Board, and the Fire Hazard Board. To this department fell the care of the Division's permanent properties, their maintenance and upkeep, until such time as they should be disposed of. Plans were laid to bring in and market, during the season of 1919, all logs that had been felled and bucked in remote places in anticipation of the arrival of the railroads.

An extensive program of fire protection was also laid out, contemplating control of the field of the Division's operations for a year or more. When the Division first came into the Northwest woods, not a little apprehension had been felt by the timber owners and people at large at the advent of an army of inexperienced men, who had small idea of the precautions necessary to prevent forest fires. To discount this danger the Fire Protection Department was established, and maintained a patrol and an organization, which included an educational fire-prevention campaign among the men. How effective these methods proved is evidenced by the figures. Only fourteen fires occurred in the operations of the Corporation in the 1918 summer season (an unusually long and dry one), damaging some 3,310,000 feet of timber, with a money damage, including that to equipment of $10,000.00. During the same period 2,904 fires occurred in commercial operations in the same territory, which included only about three times as many men as were employed in the Division's camps. These fires represented a timber damage of 1,359,473,000 feet, and a money damage of $2,000,000.00. Mr. George S. Long, manager of the Weyerhauser Timber Company, and president of the Washington Forest Fire Association, bears this witness in his annual report to the members of the association: "The fire patrol work of the Spruce Production Division in the forests of western Washington, during the summer of 1918, was an illustration of what can be accomplished by thorough and painstaking effort on the part of the operator, and affords a lesson which the logging and lumbering interests of western Washington can well afford to copy."



COMING FOR A LOAD
Rived Cants, Truck and Plank Road

The second department under the Corporation's reorganization was the Legal, in charge of Major F. D. Eaman, and later of Mr. John P. Murphy. It included the old Legal, Lumber, and Fir Departments. This department also continued the work of the Contract Board, in securing the cancellation and settlement of all contracts, so soon as audit and the rendering of accounts made this possible. The third department was designated as the Sales Department, under Major Lenihan, and included the old Sales, Purchasing, and Lumber Inspection departments. Finally, the Finance Department was created, including the old departments of the Comptroller and Treasurer, of Accounting, of Property, and of Traffic. Major Campbell was placed in charge.

One further change was necessitated by the fact that Brigadier General Disque was discharged from the service, at his own request, on March the tenth. On the twentieth day of that month the Board of Directors of the Corporation decided that he should retain the presidency until April first, when Lieutenant-Colonel Stearns should succeed him in that office. At this same meeting Colonel Stearns and Mr. (formerly Major) E. S. Grammer were elected members of the Board, and Mr. John P. Murphy was made secretary.

The Spruce Production Corporation continues its existence for a space, on a peace-time basis; as such it will write *Finis* to a battle that may find no separate mention in the histories of the future, but none the less was a turning-point toward victory—The Battle for the Supremacy of the Air.

CHAPTER XIII

A Study in Costs

O MUCH for the Division's problems; for what they were, for how they were faced, for the methods used to overcome them. They tell the struggle part of the story; they show the Division in action and under fire. But a word or two must still be added. There is the important question of costs as related to production; there is something to be said of the spirit of the Division, its behavior in action; and finally a rapid survey must be made of the accomplishment.

The cost of aircraft production may be viewed in two separate and distinct lights, according as one adopts one of two separate and distinct standpoints. It may be viewed wholly from the commercial standpoint. Such a point of view looks ultimately toward but one thing. Every policy must be judged, every expenditure must be made with reference to that one thing; production itself is of importance only as it contributes to that one thing; and that one thing is profits. As matters actually stood in the Division's case, operations gravitated toward an entirely different point—a maximum production in a minimum space of time. Profits were no part of the program; though, nevertheless, expenditures were kept as low as was consistent with the chief aim. In this case, production was not viewed from a commercial standpoint; it was viewed from a war standpoint, from the standpoint of a war need. And this consideration changes the entire aspect of costs and methods.

Costs of the spruce operation were not excessive. This was not a commercial undertaking at all. It was a war expenditure. It belongs in that category. When compared with other war expenditures, these same costs become a mere bagatelle. The cost to the Government of a single day of hostilities has been estimated at $50,000,000.00. It can scarcely be less than this. The entire cost of the spruce operation, including all capital expenditure, and every other item that might thinkably be added, was not more than this. If therefore, the spruce operation cut off even one day of hostilities, the Government broke even financially, and saved at least hundreds of the lives

of American men. If the spruce operation shortened the war by so much as a week, the Government could well afford, were it possible, to jettison the entire catalog of movable and permanent assets, railroads, real estate and sawmills, in the middle of the Pacific, and still be several hundred million to the good. And the facts are that the spruce operation was one of those essential links without which the war could not have been ended certainly before 1919.

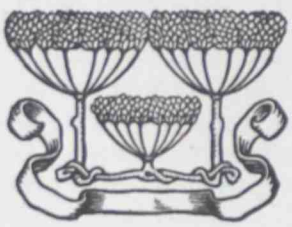
Three big mills, one at Toledo, Oregon, and two in Clallam county in Washington, were in course of construction, and no one of them ever turned a wheel or sawed a log, being incomplete at the time of the halt of operations. Some of the railroads, some of the most costly of them, never hauled a log. The point is that the spruce business was looking to a future; to a future quantity production of 100,000 planes a year, or however many might be necessary to insure Allied air supremacy. Enough aero lumber had to be gotten out to support any air program, no matter how huge or how ambitious. The future was uncertain; the demands it might make were calculable to a degree, but there always remained the factor of the unexpected. It could be discounted only by preparations on such a scale as would take care of any emergency whatever; not merely the emergency that was likely to transpire. So the Division kept organizing for greater and greater demands. So did the rest of the army. The draft of September 12, 1918, with its attendant expense was "unnecessary." Only half of the great American Army ever went overseas, and not more than 70 percent. of that half ever saw actual service at the front. It might be alleged that we created an army of over 4,000,000, whereas scarcely over a million and a half were really necessary. But such an allegation would be without sense or reason. It was the sheer weight of that organization—military and industrial—behind the men actually in the trenches that broke the German morale and hastened victory. Even reckoning that the money cost was high, the spilling of much human blood was obviated. Unlike the Hun tactics, the United States put its money and not its men in mass formation. You don't have to fight a man, whether with fists, or arms, or the weapons of business, in order to make him surrender, if you can prove to him in advance that you are enough stronger than he is to make his defeat an absolute certainty. And this is even more true of nations than it is of men.

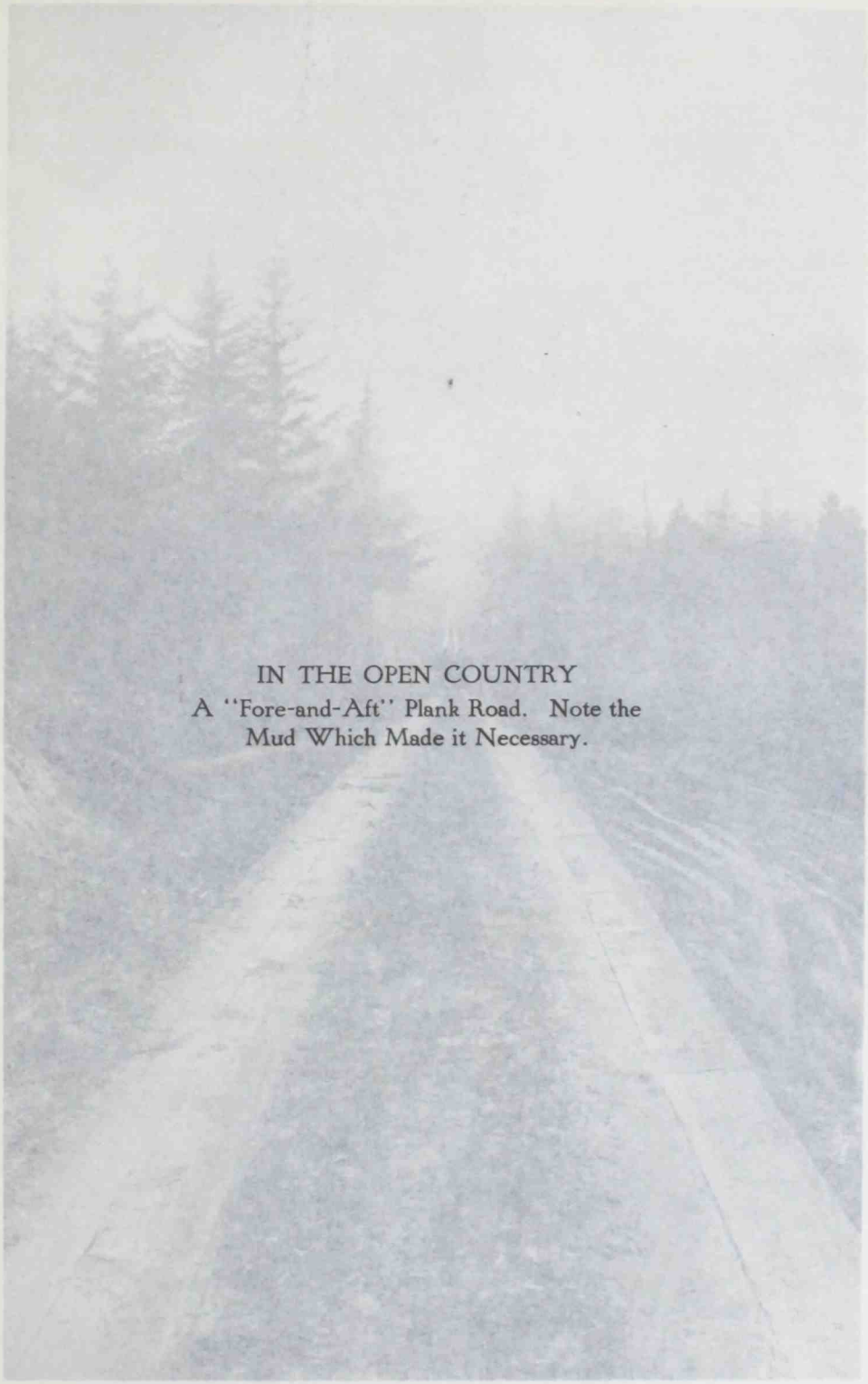
Cost-plus contracts were made because of necessity. No one knew what it would cost to build a railroad in war time through these forests of the Northwest. There was no precedent, no experience, by which to form a judgment. To have found out would have required months—years perhaps. And the men in the front line trenches could not wait. The only recourse a contractor could possibly have had would have been to make a bid so high as to be beyond reason. No contractor could be found to bid at all. The only basis of operations was a cost-plus basis. The cost of labor and materials constantly rose higher and higher, and the element of haste continually added to the totals. When all this is taken under consideration, the wonder is that it was kept at the level at which it was held.

In selling the aero lumber produced, an amortization of $105.00 was added to the selling price of each thousand feet, the object being to wipe out com-

pletely the investment in capital expenditure. Thus each purchaser of aero lumber, whether an American factory or an Allied government, was caused to share in the investment involved, in exact proportion to the purchaser's use of the material. Had operations been continued, complete amortization would have been effected by March 31, 1919. At first the amortization was applied only to the material manufactured at the Cut-up Plant. In October, 1918, the system was extended to apply to all sales made by the Corporation. If the time had been allowed to work out the problem of costs to its conclusion, therefore, at about the same period the Division reached its peak of production, there would have been a substantial decrease in the selling price of the product to the consumer.

The end of the war found the United States Spruce Corporation running smoothly along, a big organization fully equipped and set in motion, guaranteeing to the great 1919 drive on the Western Front, which never came to pass, an abundance of aircraft with which to "carry on"; a big organization producing at a rate that left plenty of margin of safety; and furnishing the product at a lower cost than had been possible up to that time. Hard as the Division struck for country, for liberty, for civilization, the mightiest of its blows was arrested in mid-air, and never fell at all. This enterprise was not a commercial venture. It was a war-measure. And as such, its expenditures were reasonable. They are justified because of the fact that the Division "delivered the goods."





IN THE OPEN COUNTRY
A "Fore-and-Aft" Plank Road. Note the
Mud Which Made it Necessary.

CHAPTER XIV

The Spirit of the Division

Guns are silent, drums are mute;
Sir, receive our last salute!
HAIL AND FAREWELL! We greet you, and we go
To far-off climes where yearning home-fires glow.
Empty our hands of wonted victor's spoil;
Seared and scarred with months of drab-dull toil.
But strong our hearts and full! Can we not tell
Where'er you led we followed? Hail and farewell!
Pvt. Owen Rhodes.

HESE LINES, an apostrophe to General Disque, were written by a soldier of the Division. They first appeared in the weekly Post newspaper published by the men at Vancouver Barracks, under a date closely following the beginning of demobilization. They voice the Division's valedictory to the Commanding Officer. But they do more than this. They speak the spirit of the Division. They are an echo of what was in the hearts of the thousands who toiled drearily in the remote halls of the forest, or bent their backs and their energies to the burden of the mills.

Forgotten men! Those of the line or those who bore the insignia of rank. Press, pulpit and platform have re-echoed to the sound of praises sung for those who journeyed across the tossing waters to the fields of glory and of honor. But there was only a mild apology for those who, perforce, stayed to the months of drab-dull toil—when they were remembered at all. So far from being the idol of the multitude, they frequently were the mark of the critic, the victim of the satirist, the prize of the cynic. A few there were to do them honor—when they remembered. The many simply forgot or never took the trouble to know of them at all. To greet the returning legions from foreign soil, the crowds massed themselves, the bands played, and flags were flung to the breeze; they listened with bated breath and eager curiosity to the tales of valor from overseas. But no crowd gathered to hear the tale of spruce from the Front at home.

Empty-handed, the men from the Spruce Front returned. Not a German helmet, not so much as a bit of shrapnel, not a single speaking souvenir of

victory. Is it not curious that we judge the victor and the extent of his victory by the extent of his spoils? Empty-handed; and yet not empty of hand. Did not these hands bear the sears and scars of the months of drab-dull toil? These were their spoils.

They did what they were told to do. They obeyed. That is the essence of good soldiery. If they did it with good grace, instead of with bad, did that fact make them less good soldiers? They never ceased to feel and feel keenly, the unenviable quality of their position. They were not "sprucers" from choice. They buoyed themselves constantly with the hope of being allowed one day the privilege of sharing the hazards of the battle front. Speaking at Vancouver one day in late July, Mr. John D. Ryan announced that it was planned to permit General Disque to take a regiment of his men overseas, as a reward for duty well done. The announcement was greeted with a very hurricane of mad cheering. They fed their spirits on the hope that was in that promise; and at the last they were doomed to bitter disappointment.

It was a curious sort of morale they maintained. It wasn't a morale built upon a liking for their tasks. "The sooner we get done with this job, the sooner the Kaiser's licked," Colonel Reardan told the men at the Cut-up Plant on one occasion. "The sooner the Kaiser's licked, the sooner we get done with this job," was the sour comment of a soldier. But much as they would have liked other tasks, they hung to and stood by these which had been given into their hands. The foundation of their morale was a sure and simple sense of duty. And on that the spirit of the Division throve, despite the hands empty of victor's spoil.

Tangible Evidence

As bearing witness to that spirit stands the record of the Division on the Fourth Liberty Loan. The drive for these bond subscriptions began on September 28, 1918. Everyone will recall that subscriptions seemed to be very slow in coming in. Peace talk was in the air. Consciously or unconsciously the nation had begun to relax. The Spruce Division was no exception to the general rule, and the sale of bonds was lagging badly. The first weeks of October flitted by, and the stream of buyers still flowed in desultory, sluggish, fashion. The end of the campaign approached. The Division had subscribed less than a million dollars. On October 18, Secretary of the Treasury McAdoo sent out an "S. O. S." In response to this, General Disque communicated by wire with every Loyal Legion local, and every detachment of troops in the Division, appealing for extra effort during the two days remaining of the campaign.

Thus began the "Disque Drive". The Division peeled off its coat and went into hurry-up action. The eighteenth and nineteenth of October were two hectic days. Bond subscriptions were solicited and began to pour in from every quarter. Ground hitherto touched was gone over again. Activities

were both extended and intensified. It indicates enough, perhaps, to say that the record for the Disque Drive including subscriptions from Loyal Legion members as well as those from the soldiers reached a grand total of $6,768,550. This, when added to the results of the regular drive of the weeks preceding, created a total of $7,731,350. Of this amount the soldiers themselves subscribed $1,967,000, an average of $71.60 for every officer and enlisted man in the organization. Eighty per cent. of the entire personnel were subscribers, the number being 22,150. The average subscription was $88.80. And these figures take no account of many subscriptions made through civilian channels and unreported.

A similar good record was made in the drive for the United War Work Campaign, launched on November 11, the day the armistice was signed. In spite of the fact that it came at a time when the Division was "up in the air" from the general jubilation, and the halt of operations, and the wondering what was next, a total of $26,977.95 was rolled up according to the reports of the general treasurer for the fund, Major T. A. Mills. This figure also takes no account of subscriptions made locally and unreported. It is, however, an average of approximately a dollar a man.

Some Documents

Mr. John D. Ryan also attested to the fine spirit of the Division, in the message which he sent upon the occasion of laying down his duties as Director of Air Service. Mr. Ryan's message reads:

"In leaving the Air Service to take up the duties of civil life, I desire to express to all of you my deep appreciation of the loyal support given in the performance of a public duty, and to acknowledge the debt of gratitude I feel toward you all, for the fine spirit which has been shown throughout the organizaiton during my direction of it.

"Very trying conditons have existed during the time that has elapsed since the bureau was created, the work of all of you has been hard, and sacrifices have been the rule and not the exception.

"I want all of you to know that I believe the work of the Bureau has been intelligent and effective, and that it is the sum of your individual efforts that has made it so.

"Our contribution to the glorious ending of the war is one of which we may all be proud, and in laying down my work because I find it necessary for me to take up other things, I take with me recollections of loyal support and devotion to a holy cause, on the part of all who have been associated with me in the work."

And we may add to this, General Disque's own words of appreciation in his Thanksgiving Day message to the officers and men of the Division:

"The great war is over and for the world, for the nation, and for ourselves, we are thankful. Our part has been carried on far from the battle front with no chance for distinguished service in combat, but let every man remember always that without the airplane lumber, which we, practically alone, have furnished for the entire Allied cause, this day of thanksgiving could not have been.

"You, as well as your comrades overseas, have won this war and a feeling of duty well done should prevail in your hearts this day and every day throughout the great future that lies before each of you.

"I congratulate you upon your achievement, and from the bottom of my heart, I thank you."

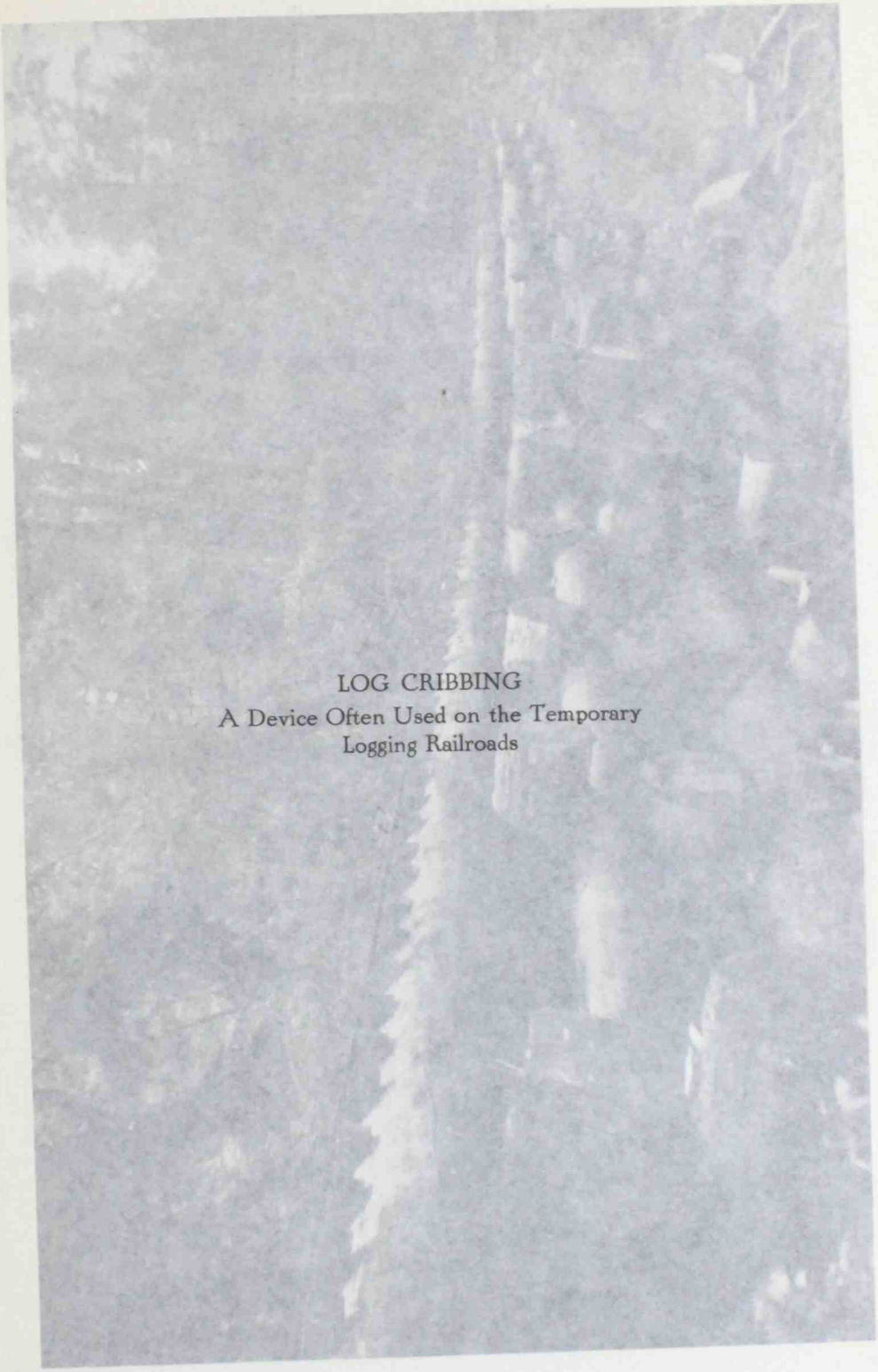
CHAPTER XV

The Accomplishment

HE READER, having thus far perused these pages, should find himself possessed of certain clear ideas of the magnitude of the task which the Army of the Northwest was called upon to perform, of the means which it took to perform it, and of the tangible results which it accomplished. But it may well be that he has been taxed overmuch with too great a concourse of facts and words and figures, so that for him the size of the mountain is hid behind the overhang of the bank, the forest invisible by reason of the multiplicity of the trees. Should this be the case, he may be grateful for a view of the matter as a whole, with the detail omitted that the broad outlines may appear in firm and bold relief.

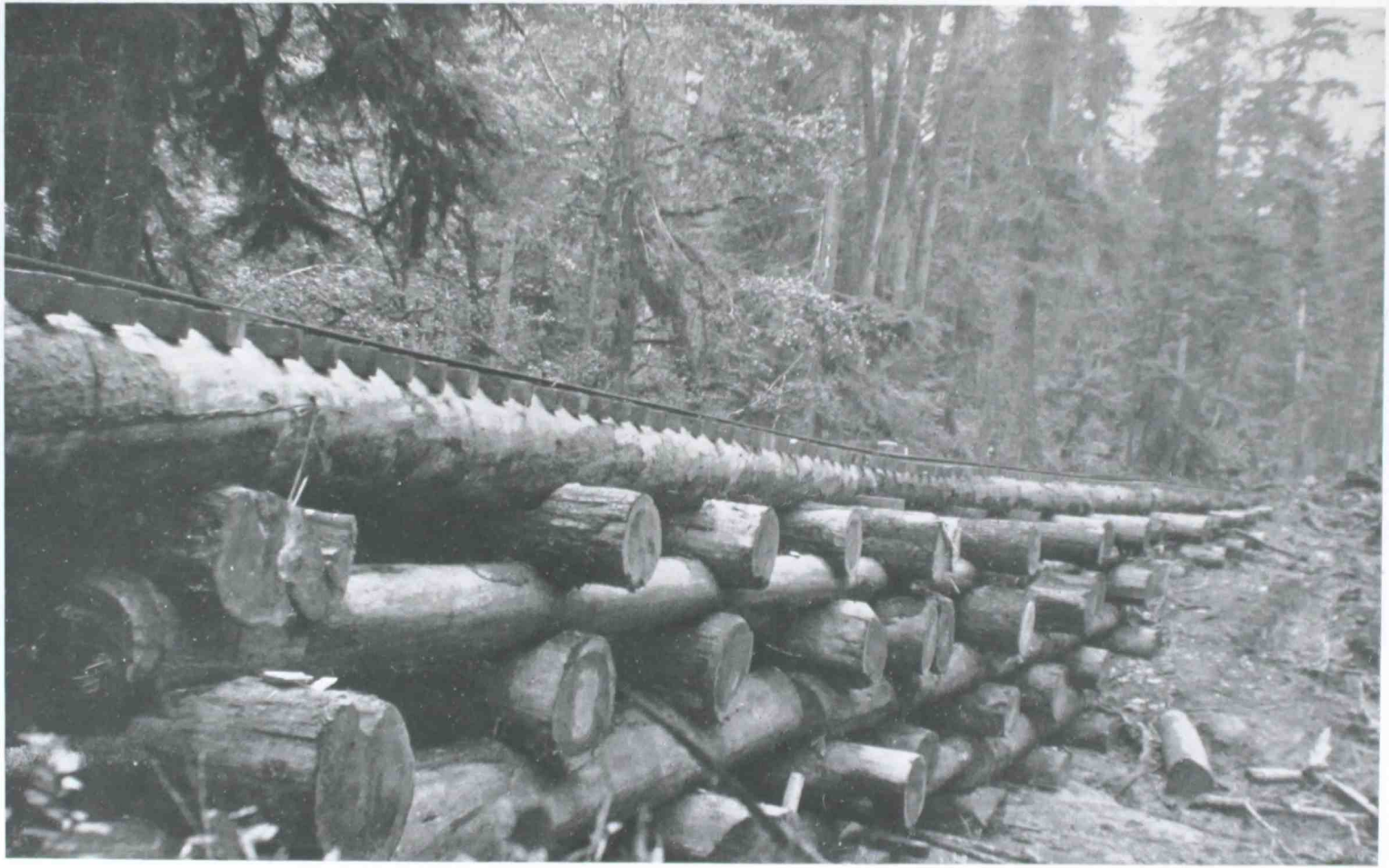
First of all there should be an understanding of the conditions faced by the Division when first it came to the performance of its task. Of those conditions the analyst would find six disconcerting phases. Let us catalog them in as many paragraphs.

First and foremost stands the phase of production itself. The output of aero lumber was below even its ordinary standard. It was one-fifth of what the demand then was, and one-fifteenth of what the demand was to be in less than a year. The great spruce belt was tapped throughout its entire length in the United States, by but six railroads, and these did not cover the heavier spruce areas. The relatively small demand for spruce before the war had not provided the incentive for developing the industry. A few vivid months, a year or two, of war-demand on the part of the Allied governments had stripped the accessible territory of its best spruce. Furthermore, spruce does not grow, like the fir, in thick forests, but the trees occur sporadically, scattered hither and thither among the other trees, so that, even in the best spruce country, an average of one good airplane spruce to five acres is considered a fair stand. To be sure, the timber was there; but reckoning on the basis of the equipment available in the summer and fall of 1917, it might almost as well have been in Timbuctoo.



LOG CRIBBING

A Device Often Used on the Temporary Logging Railroads



Just as vital was the phase of labor. Unrest had smitten the lumber industry; unrest and discontent and ill-feeling expressing themselves in strike, sedition and sabotage. And in addition to all this, a labor shortage in a world very short of labor, had laid its paralyzing hand upon the Northwest woods. Without labor, ample, efficient and contented labor, there could be no substantial increase of lumber. And in the early fall of 1917 no means of amplification were in sight, and the supposition of a contented labor seemed almost Utopian.

To these items there must be added the natural opposition on the part of an industry long established, to changes of a radical sort. Yet changes were imperative, and must be accomplished. The new demand for lumber was so different in its magnitude and in its requirement from that of normal days that the usual methods were hopelessly inadequate. This conservatism of the industry is an intangible factor, but none the less effective in creating a real barrier to the success of the undertaking.

And also this: that there was no organization in the Northwest huge enough, with equipment enough, or with capital enough, to swing an enterprise of the magnitude demanded. Such an organization had to be created, to be built from the ground up. Some of the raw materials were at hand, and some were not. Of those that were, some, such as the labor, had to be worked over and put in shape. Yet the end could not be accomplished without the organization.

And again add to the sum total that the work was begun in the fall. This accident of time meant not a little. The precious summer months, the dry months, only in which construction and development operations could be carried on with real effectiveness, or at all, had slipped away. By the time of the Division's inception, the rains had begun, to continue with the peculiar steadfastness of the west coast rainy season that precipitates eight feet of moisture each year, and continues until the late spring, rendering the forests dank and unbelievably wet, and the ground soft and sticky.

Then add at the last, the dire need for urgent haste. The Mailed Fist was pounding at the door of Democracy, demanding an entrance in the high and haughty name of its own Might. The little nations lay prostrate; France and Italy fought upon their knees; Britain, battered and bleeding, cast dolefully the bodies of her sons in the path of the ruthless foe to stay his tread. All these waited expectantly for America and Air-Power. There could be no dallying. That which was to be done must be done quickly.

The Concrete Results

Such was the outlook, such the beginning. Let us spring now in thought to the end, remembering always that the formal authorization for the Spruce Production Division is dated November 15, 1917, and that before the middle of the next November, the German collapse had brought the Division's progress to a halt. A little less, therefore, than a year comprised the active

life of the Division. What are the concrete results of that brief year of effort?

Again let us be categorical; we may set down these concrete results under seven different heads, and devote a paragraph to each.

The production of spruce and fir aero lumber was increased 1,700 per cent. on a comparison of the average monthly output in the fall of 1917, with the same output in the fall of 1918. Nearly 145,000,000 feet of aircraft stock was shipped from the west coast during the Division's year. At the beginning of it, the production of super-selected airplane stock aggregated less than a million feet a month. At the end it approximated twenty-five million feet a month, and the Cut-Up Plant was turning it out at the rate of nearly a million feet a day, the equivalent of 600 to 1,000 planes of ordinary size. In the brief period from February to November, 1918, this mill sawed over eighty million feet of aircraft lumber, and in addition thereto, fifty million feet of commercial cut. So much for the result in production. In a sense it tells the whole story; in a sense it does not begin to tell half of it.

The labor problem was attacked with energetic directness. The shortage was amplified by the audacious plan of taking men from the Army and farming them out to contractors. That is, it seemed audacious when it was done; but because the plan was correctly worked and efficient, it seems now the natural, the to-be-expected thing. The unrest, the discontent was cured. The industry went through the year without a strike. The wobbly was dispossessed of what he deemed his inheritance, and sedition and sabotage driven into desuetude. The labor turnover was checked, and a new era of good feeling between employer and employee inaugurated. The basic eight-hour day was established for all time, and the conditions in the camps affecting the environment of over 100,000 men greatly ameliorated. And the work of the Division is not temporary in this particular, but permanent. Its beneficent effect will be felt for years to come.

The Division built thirteen railroads to reach the big timber areas of the coast region, with an aggregate of 130 miles, and an additional eighty miles graded for track. One of these was laid, logged over and torn up. All but a small fraction were broad gauge roads, and four of them, with over eighty miles of rails laid, and seventy-seven additional miles graded, were built to stay. These roads were constructed in the roughest sort of mountain territory, and they were put through with equipment ordinarily considered utterly inadequate. They have made accessible twelve and a half billion feet of standing timber, of which two and a half billion is spruce, four and a half billion is fir, four billion is hemlock, and the remainder cedar. The four roads permanently built open up areas not only for timber but for agricultural development, and have thrown forward the progress of the territory they occupy at least a quarter of a century. Soldier labor built them.

Soldier labor also built the three great mills which were constructed by the Division at strategic points, to render the greatest assistance to the steady flow of lumber from tree to trench. The great Cut-up Plant at Vancouver with its twelve carriages and its battery of twenty-four dry-kilns, was completed and in operation from early spring of 1918, and at the close of October

was turning out aircraft lumber at a million-a-day clip. At Toledo, Oregon, a great sawmill with a capacity of a million feet a day was seventy per cent. completed on November 11. The Cut-up Plant planned as an auxiliary to this mill was finished and awaiting installation of machinery. It stands at the junction point of three of the Division roads, and is the natural outlet for 3,000,000,000 feet of standing timber. It is the largest mill in the world, with the exception of its twin at Port Angeles, Washington, also a Division mill, and also seventy per cent. completed on November 11. Further, the Division program called for the erection of a fourth great mill at Lake Pleasant, Washington, at the western terminus of Division Railroad Number 1, just as the Port Angeles mill is at the eastern terminus. Together these last two mills are so situated as to provide outlet for nearly 7,000,000,000 feet of timber in Clallam county. As is the case with the railroads, so these mills have thrown forward the industrial progress of the region.

Not only was the volume of aero lumber increased, but the percentage of that lumber actually usable for airplane manufacture greatly increased. This was due to sawing technique introduced by the Division in the commercial mills, and to the practice of re-sawing in the Cut-up Plant. Prior to the Division's entry into the lumber arena, not more than fifteen per cent. of the lumber shipped East as "aircraft" could be utilized for that purpose by the factories. One year later, in October, 1918, the "aircraft" produced by the Cut-Up Plant was found nearly ninety per cent. usable.

And besides all this, as an incident, so to speak, a great problem of supplying the industry with engines and cable, and a multitude of lesser items of equipment was solved, which could not have been solved without the aid of the Division; and lacking the solution of which the attempt to increase the supply of lumber to anything approaching the demand must have failed miserably. As a further incident to its main task, the Division solved a complex problem of traffic. A car shortage which menaced the entire program was overcome, and the time of transit of lumber to eastern ports cut down two-thirds.

Still more: the way was built up, the instruments and vehicles made ready for an enormous quantity production. The building of such a program cannot be accomplished in an hour, nor in a day. Pending its completion, the Division so speeded up normal channels by the introduction of new devices in operation, by the decision to rive, by selective logging, by the full use of existing means, that no time was lost, but production came monthly in an ever increasing flow, despite the fact that some of the chief links in the chain of quantity production remained unfinished. In building up the aim for the future, in assembling the parts for a gigantic industrial machine, the immediate need was not only not overlooked, but was more than met. The Division was dealing with two staggering problems at once—the problem of the future, and the problem of the present—and meeting both effectively.

So we leap from crag to crag of the Division's accomplishment, pausing with each leap for the briefest sort of survey. But even the recapitulation of

these concrete results does not tell the story of the Division's accomplishment in full. Through it all, and behind it all, there must be seen this: that a huge organization was built up, with speed, and yet with a certainty that guaranteed the soundness of the structure. At the end, it was in such shape that it could be taken down, closed out, with credit and with economy. It possessed the good will of the industry with which it had to deal, and good will is a tangible asset in any business enterprise. In relinquishing its hold upon that industry, it left behind no trail of ill feeling, no spleen, no rancor.

In witness whereof, it may not be amiss to quote the expression of the leaders of the Northwest lumber industry. The West Coast Lumbermen's Association meeting in conference in Portland, on November 16, 1918, gave unanimous support to the resolution here following:

"Whereas, We prepare now to sever our heretofore close associations with the Spruce Production Division of the Signal Corps, we desire most earnestly to give to the public a statement of commendation of the efficient and successful work of the Division in the duty assigned it of securing the necessary quantities and quality of lumber needed for airplanes for all the Allies. Far removed from the glamor and the glory that helps to alleviate the pains and sufferings of the fighting front, the officers and men of this Division have labored unceasingly, many of them realizing that in all probability the one opportunity for an active application of their chosen profession was being denied them while they devoted their ability and energies to the important work of supporting the fighting units. To General Disque, we reaffirm our many expressions of confidence, now proved undeniably justified, in his ability and integrity, and commend him and congratulate ourselves and our country that a man of such breadth of vision, such foresight, and such firm decision was placed in charge of this important work. We do not forget that it was necessary to prepare for an indefinite war, and that all activities were planned to conform. The end was as sudden and unexpected as it was welcome. Closely allied to the Army, and as an absolutely necessary part of the organization that has made possible the accomplishment of these things has been the body of men who have worked in the woods and mills, banded solidly and loyally together under the name of the Loyal Legion of Loggers and Lumbermen, and particularly to these men should be given the credit that they deserve. Now, therefore, be it

"Resolved, That we, the representatives of a majority of the lumbering industry of the Pacific Northwest, in mass meeting assembled, the sixteenth day of November, 1918, subscribe to the above as recognition of the faithful, efficient and valuable work of the department of the Government that has controlled the activities of this industry during the period of the war in which the United States has been engaged."

We have spoken of the concrete results. Yet what the Division accomplished was really little as compared to what it was prepared to accomplish. When the halt came, it stood upon the very threshold of that larger accomplishment. It had performed the task originally assigned, and blazed the way for the performance of a greatly augmented task. It had met every demand of the past and was prepared to meet any demand of the future. It was alert and ready, not only for that which might be counted upon, but for the emergency which none could foresee. And in this high pitch of preparedness is found the apex and pinnacle of the Division's accomplishment.

A Field of Honor

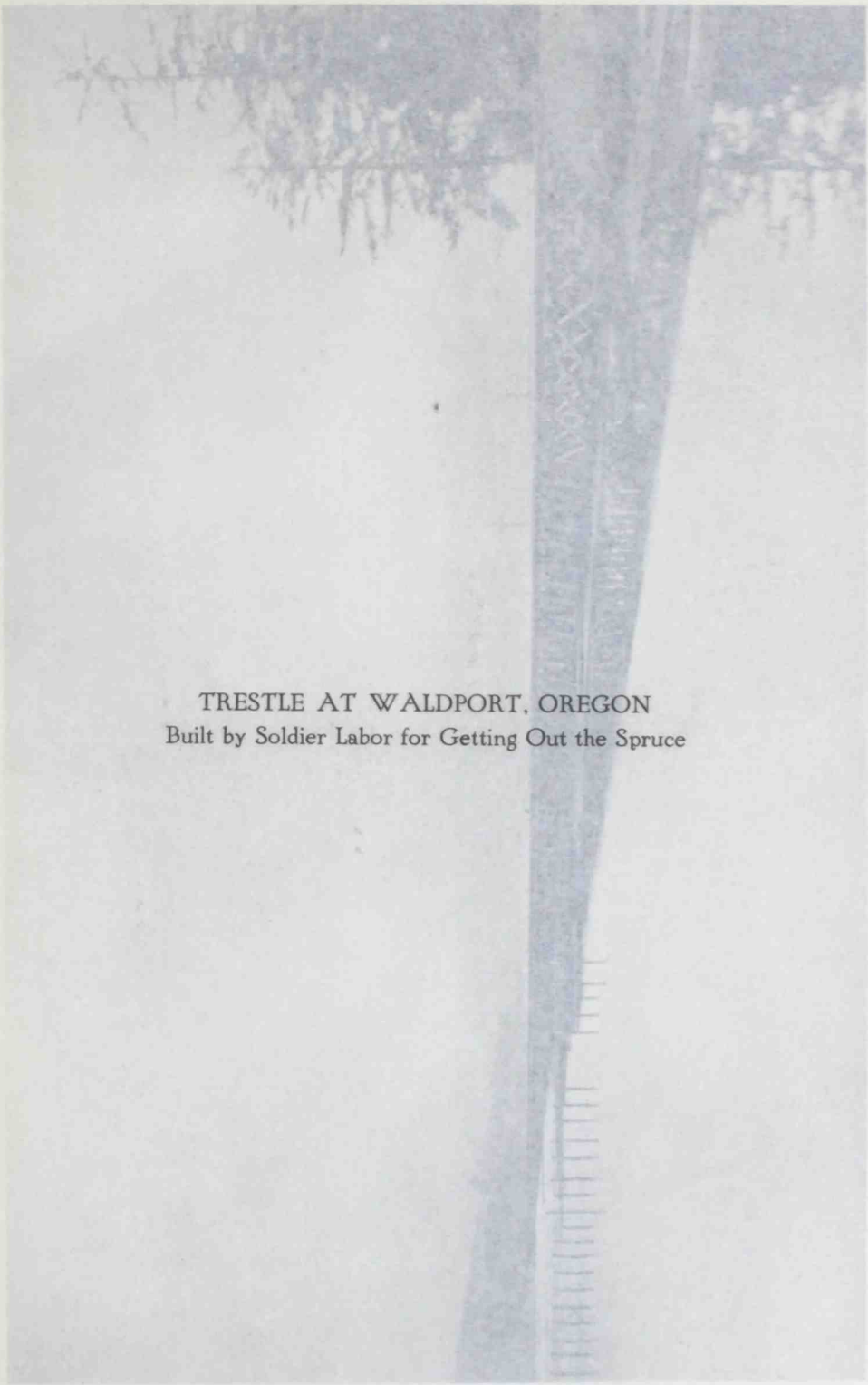
Such, then, is the story of the Spruce Production Division. It is a war story without the horror of devastated cities and of torn and bloodied men, and without the glamor that goes with victorious achievement upon the field of honor.

And yet—this Northwest woods has become a field of honor; without the heroics, but not without the heroic. He who is able to lift the surface of things a little and see what is underneath, may read here a story not wholly lacking in thrill, not wholly lacking in romance. There is the thrill of achievement; of men battling with Nature, with Nature's forces, and Nature's seeming whimsicalities. They fought, these lumberjacks in khaki. They fought with situations, circumstances, problems. With problems, some of which seemed fairly to belong to them, and some of which seemed unnecessarily thrown across their pathway, by those to whom they might naturally have looked for help, not hindrance. And these latter trials were especially hard to bear with. It was almost as if a brigade, advancing under fire, should be cut to pieces by the deliberate barrage of its own artillery support.

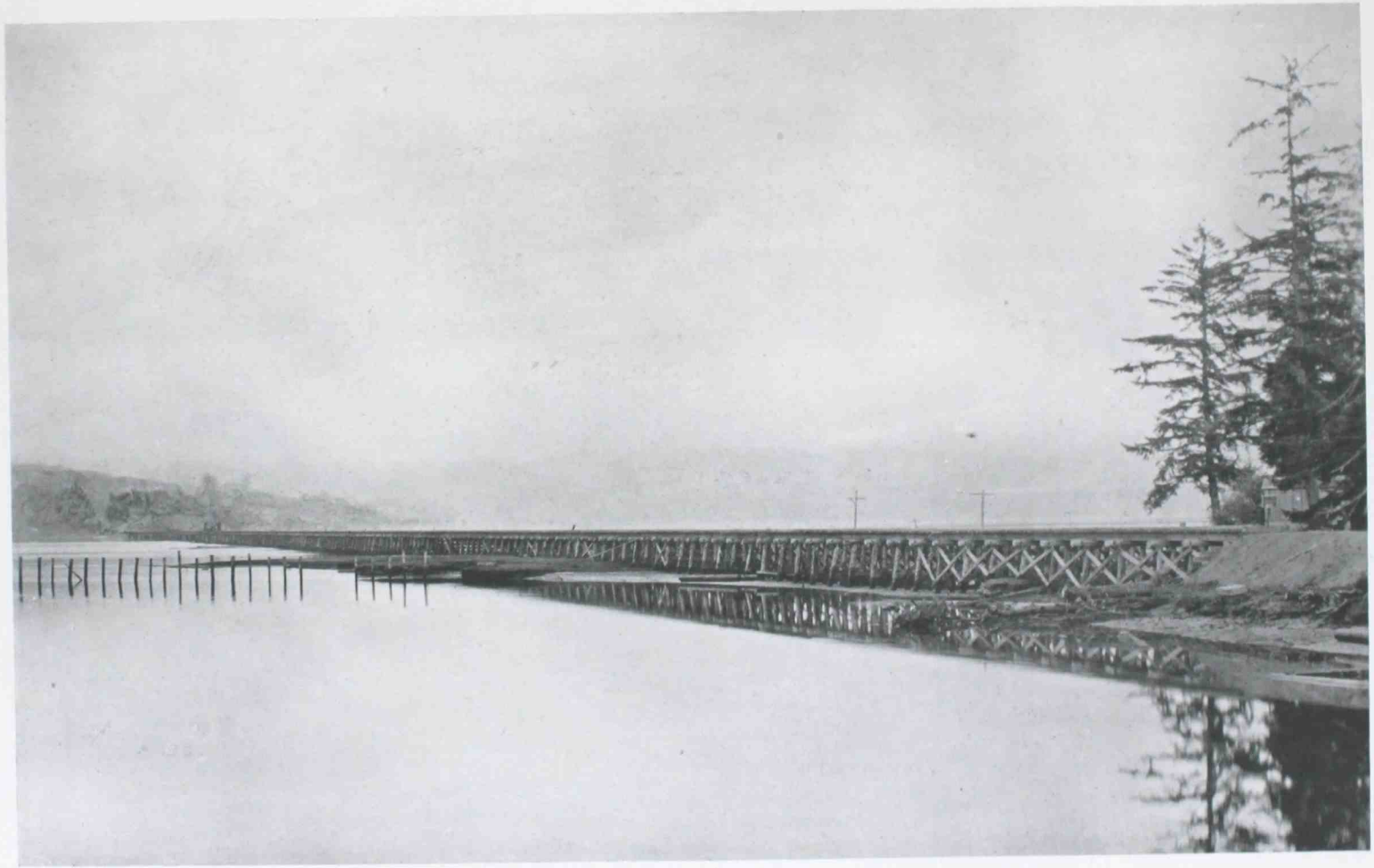
There is the thrill of big game, of big business. It was part of the big game being played on the fields of France and Flanders, and an essential part. The issue was the same; the stakes were the same. It was part of the big business that industrial America was called upon to undertake, that that line in France might move in but one direction; that civilization might be brought out of the somber penumbra of the Mailed Fist.

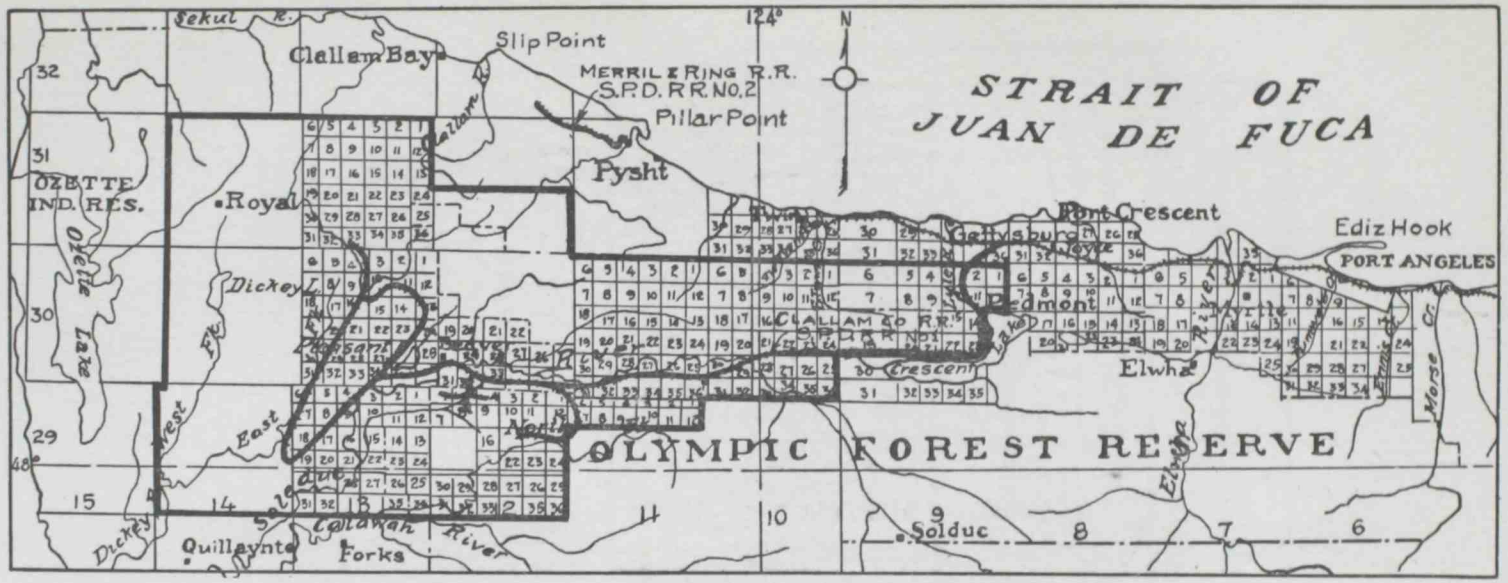
But thrill and romance did not occupy the spot-light in the Spruce Production Division. Hard work took the stellar role. Daily grind, constant effort, under high pressure. And there isn't much romance in that. Irvin Cobb, in a metaphor which has become international, described himself, when in Holland in the early days of the world war, as having "no more privacy than a gold-fish." The same might have been said of the officers of the Division. The intrusion of many matters left them little to themselves. They had no more leisure than an Ingersoll. And each day and every day they were swallowing the bitter pill that the denial of a direct participation in the great events of the European theater of war meant to them.

The point, the whole point, of the Spruce Production Division, is that it was given a job of work to do—and did it. The adverse circumstances, the problems to be dealt with made the task seem impossible at the outset. To tell how these conditions were met, how these problems were solved—that has been the purpose of this narrative. No such number of pages would be required to recite the achievement itself. That takes but a single sentence. General Disque and his Division, in one single year, increased the production of the needed airplane lumber from perhaps 1,250,000 to 23,000,000 feet a month; an increase of at least seventeen hundred per cent. Comment can add little to that stark fact.



TRESTLE AT WALDPORT, OREGON
Built by Soldier Labor for Getting Out the Spruce





CLALLAM COUNTY DISTRICT
SPRUCE PRODUCTION RAILROAD Nos. 1-2

CLALLAM COUNTY R. R. OR S. P. D. R. R. No. 1

Main Line Mileage completed	36 miles
Spurs completed	0.00 "
Spurs graded	70 "
Maximum curve	14°
Weight of rail	33 miles, 80 lb.; 3 miles, 67.5 lb.

Controls timbered area containing following quantities:

Fir	2,393,502,000
Spruce	987,309,000
Cedar	543,164,000
Hemlock	2,813,264,000

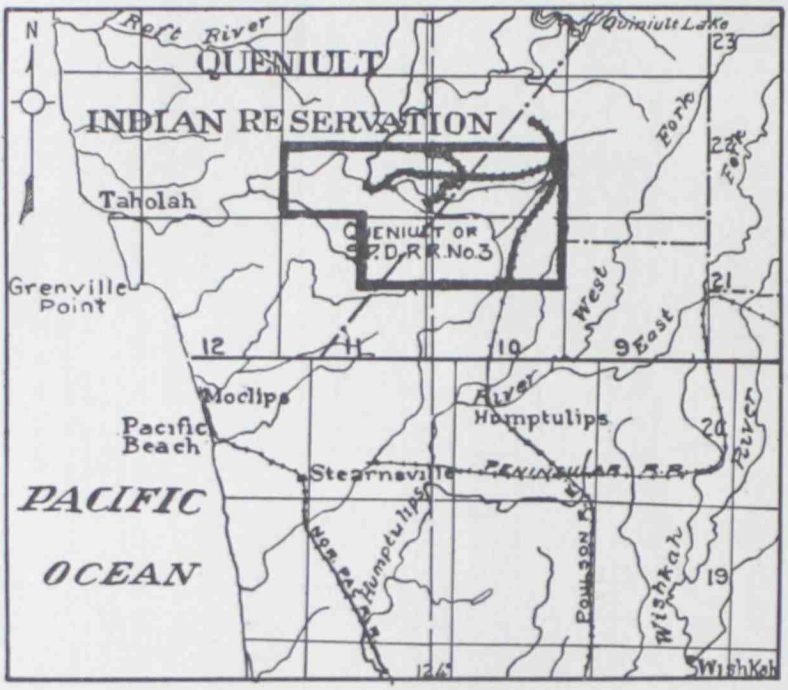
MERRILL & RING R. R. OR S. P. D. R. R. No. 2

Main Line Mileage completed	4.69 miles
Spurs completed	2.19 "
Maximum grade	3.2%
Maximum curve	16°
Weight of rail	56 lb.

Controls timbered area containing following quantities:

Fir	34,540,000
Spruce	23,650,000
Cedar	300,000
Hemlock	20,500,000

The above quantities from shaded area.



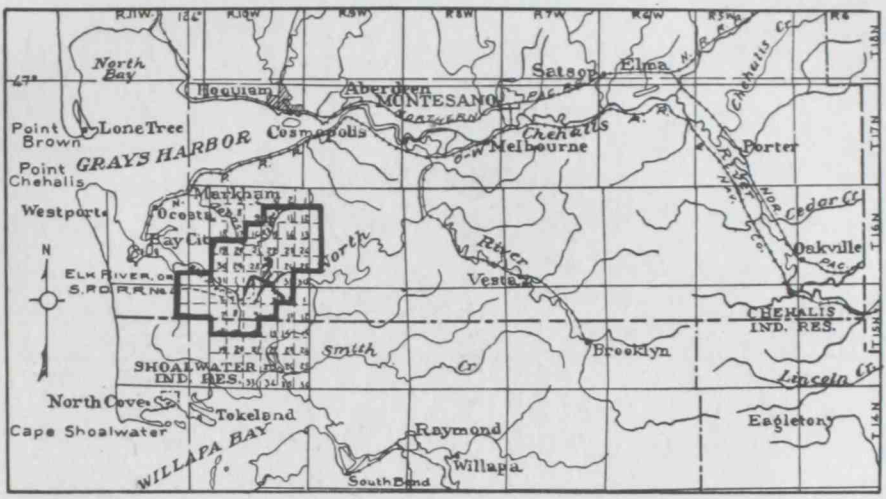
QUENIULT DISTRICT
SPRUCE PRODUCTION RAILROAD No. 3

Main Line Mileage completed	5.322 miles
Spurs completed	0.254 "
Sidings completed	0.189 "
Maximum grade	1.43%
Maximum curve	7°
Weight of rails	56 lb.

Controls timbered area containing following quantities:

Fir	341,933,000
Spruce	234,065,000
Cedar	164,196,000
Hemlock	397,158,000

Above quantities from shaded area.



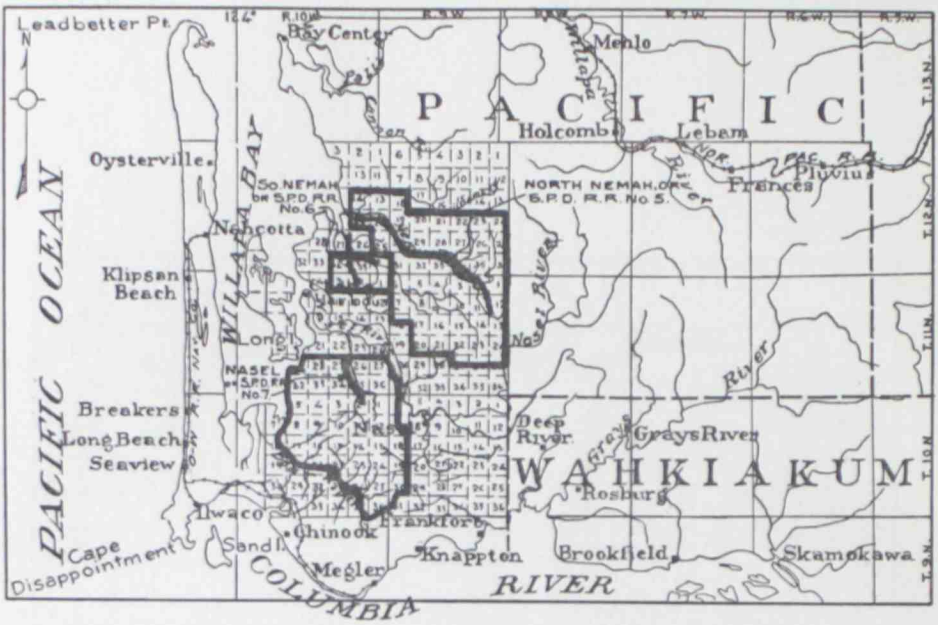
GRAY'S HARBOR DISTRICT
SPRUCE PRODUCTION RAILROAD No. 4

Main Line Mileage completed	2.14 miles
Spurs completed	0.82 "
Sidings completed	0.284 "
Maximum grade	6%
Maximum curve	3°
Weight of rail	60 lb.

Controls timbered area containing following quantities:

Fir	4,115,000
Spruce	94,518,000
Hemlock	123,119,000
Cedar	295,054,000

Above quantities from shaded area.



WILLAPA BAY DISTRICT
SPRUCE PRODUCTION RAILROADS
Nos. 5-6-7

RAILROAD No. 5

Main Line Mileage completed	7.73 miles
Main Line Mileage graded	1.4 "
Spurs completed	0.218 "
Spurs graded	0.00 "
Sidings completed	1.163 "
Sidings graded	0.00 "
Maximum grade	3%
Maximum curve	16°
Weight of rail	45 lb.

Controls timbered area containing following quantities:

Fir	228,015,000
Spruce	95,570,000
Cedar	75,652,000
Hemlock	138,980,000
White fir	4,060,000

RAILROAD No. 6

Main Line Mileage completed	2.282 miles
Main Line Mileage graded	0.30 "
Spurs completed	1.618 "
Spurs graded	0.5 "
Maximum grade	4%
Maximum curve	15°
Weight of rail	45 lb.

Controls timbered area containing following quantities:

Spruce	30,447,000
Cedar	27,897,000
Hemlock	26,875,000

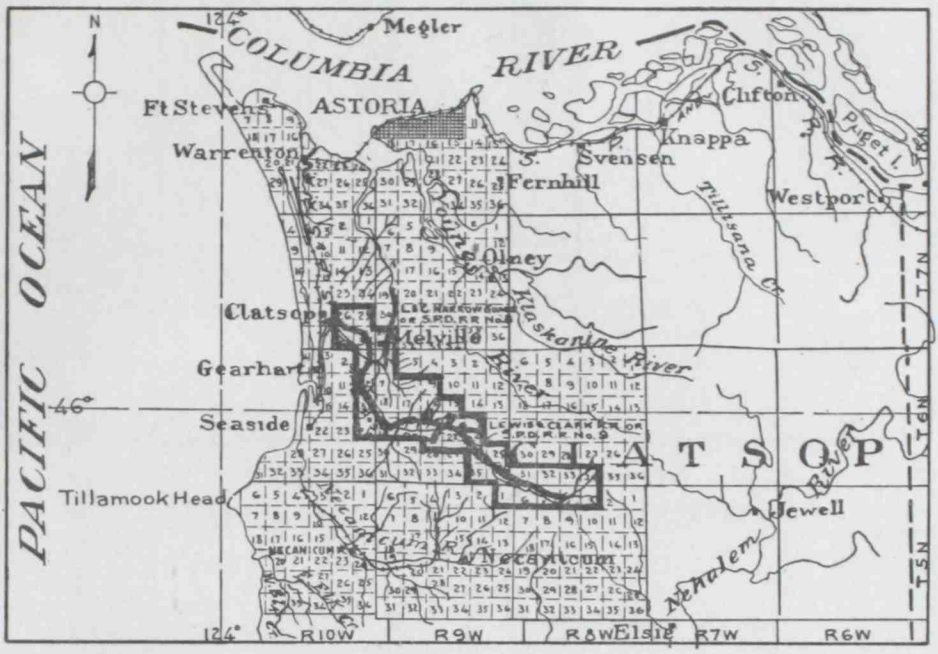
RAILROAD No. 7—36 inch Gauge

Main Line Mileage completed	1.887 miles
Spurs completed	0.171 "

Controls timbered area containing following quantities:

Fir	30,761,000
Spruce	85,537,000
Cedar	74,551,000
Hemlock	105,208,000

Above quantities from shaded area.



CLATSOP DISTRICT
SPRUCE PRODUCTION DIVISION
Nos. 8 and 9

Main Line Mileage completed	13.	miles
Main Line Mileage graded	1.5	"
Spurs completed	5.257	"
Spurs graded	1.783	"
Sidings completed	2.103	"
Maximum grade	2.2%	
Maximum curve	18°	

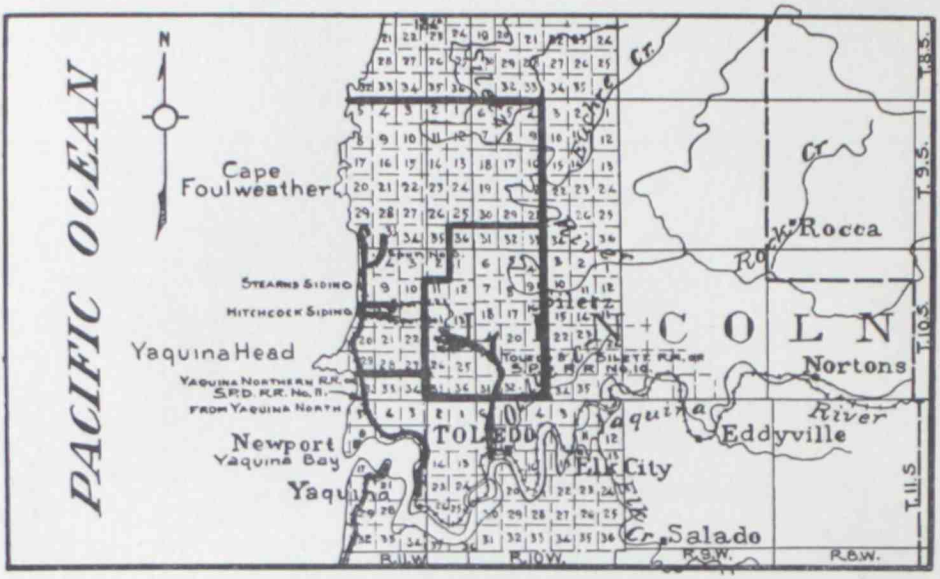
Weight of rail...6.414 mi. of 50 lb.; 4.560 mi. of 56 lb.; 2.026 mi. of 60 lb.

Controls timbered area containing following quantities:

Fir	187,720,000
Spruce	100,692,000
Hemlock	203,243,000
Cedar	1,783,000

Above quantities from shaded area.

Spruce Production Railroad No. 8 abandoned.



NORTH YAQUINA DISTRICT
SPRUCE PRODUCTION RAILROADS
Nos. 10 and 11

RAILROAD No. 10

Main Line Mileage completed	6.4 miles
Main Line Mileage graded	0.00 "
Spurs completed	1.74 "
Spurs graded	0.00 "
Sidings completed	0.14 "
Maximum grade	3%
Maximum curve	18°

Weight of rail, 54 lb. 7.2 mi.; 30 lb., .09 mi.; 50 lb., .97 mi.; 75 lb., .02 mi.
Controls timbered area containing following quantities:

Fir	375,318,000
Spruce	82,137,000
Hemlock	5,924,000
Cedar	119,000

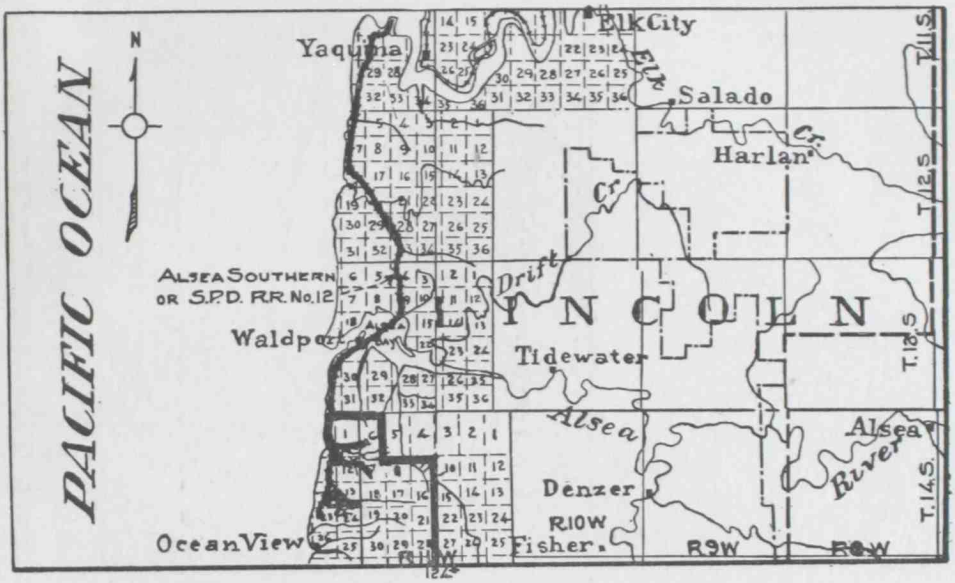
RAILROAD No. 11

Main Line Mileage completed	10.83 miles
Main Line Mileage graded	1.70 "
Spurs completed	2.09 "
Spurs graded	0.75 "
Sidings completed	2.74 "
Maximum grade	5.7%
Maximum curve	16°

Weight of rail.....0.95 miles of 60 lb. and 9.88 miles of 67½ lb.
Controls timbered area containing following quantities:

Fir	621,419,000
Spruce	604,383,000
Hemlock	138,958,000
Cedar	31,873,000

Above quantities from shaded area.



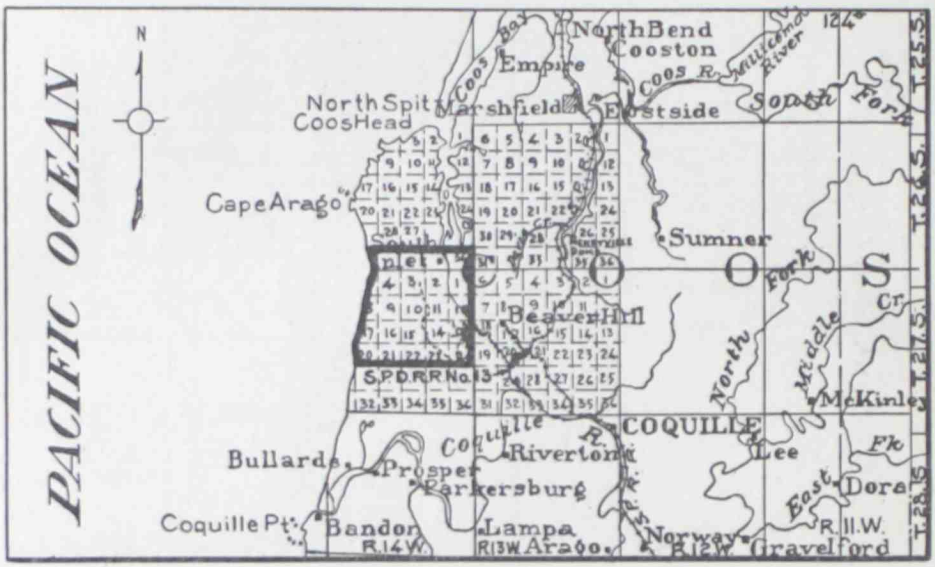
SOUTH YAQUINA DISTRICT
SPRUCE PRODUCTION RAILROAD No. 12

Main Line Mileage completed	23.424 miles
Main Line Mileage graded	0.619 "
Spurs completed	0.00 "
Spurs graded	3.36 "
Sidings completed	2.567 "
Maximum grade	3%
Maximum curve	16°
Weight of rail	60 lb.

Controls timbered area containing following quantities:

Fir	316,744,500
Spruce	253,765,000
Hemlock	200,476,500
Cedar	15,116,000

Above quantities from shaded area.



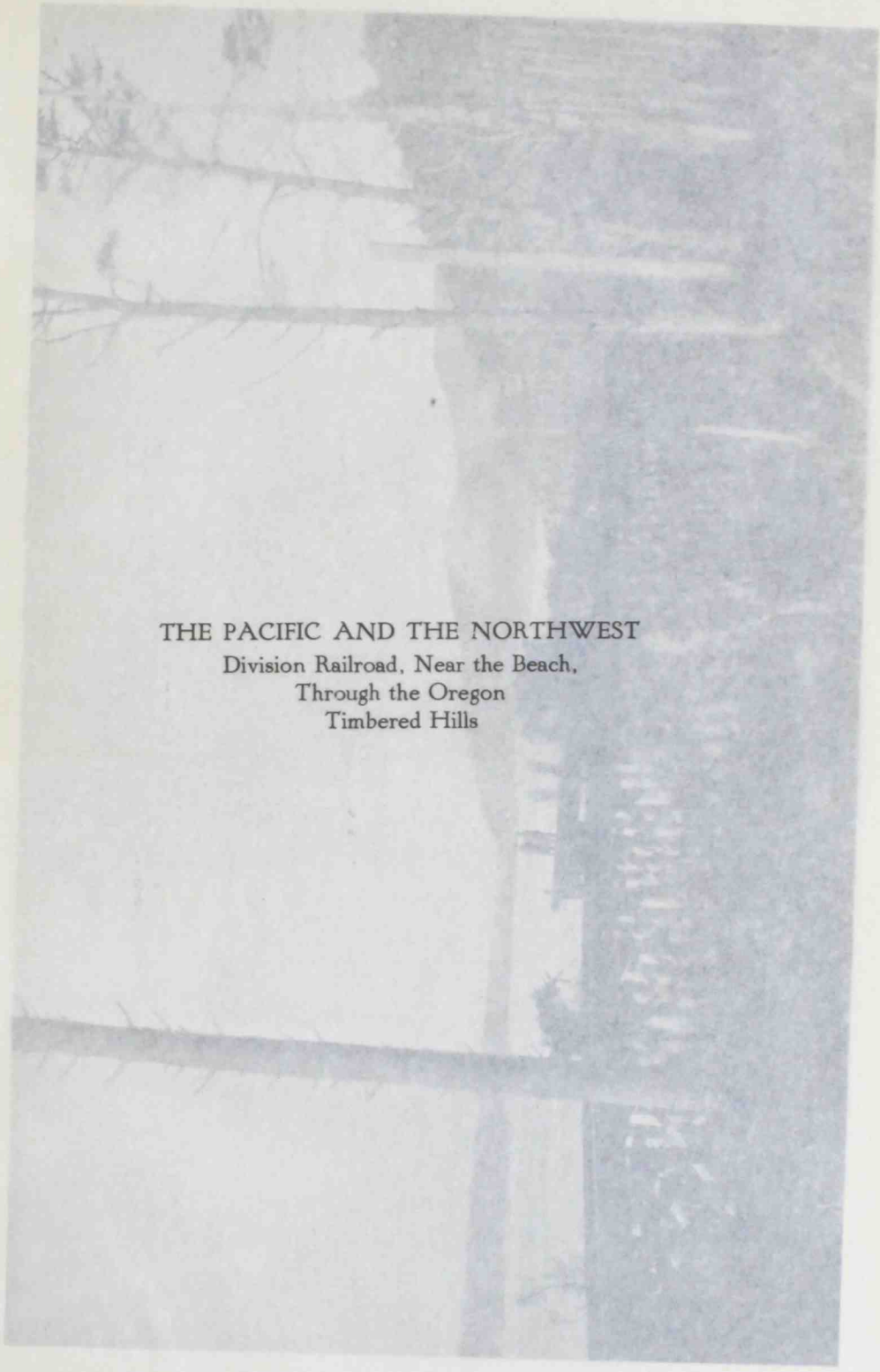
COOS BAY DISTRICT
SPRUCE PRODUCTION RAILROAD No. 13

Main Line Mileage completed	1.544 miles
Main Line Mileage graded	2.696 "
Spurs completed	0.047 "
Sidings completed	0.196 "
Weight of rail	1.544 miles, 60 lb.; 2.516 miles, 45 lb.
Maximum grade	7%
Maximum curve	20°

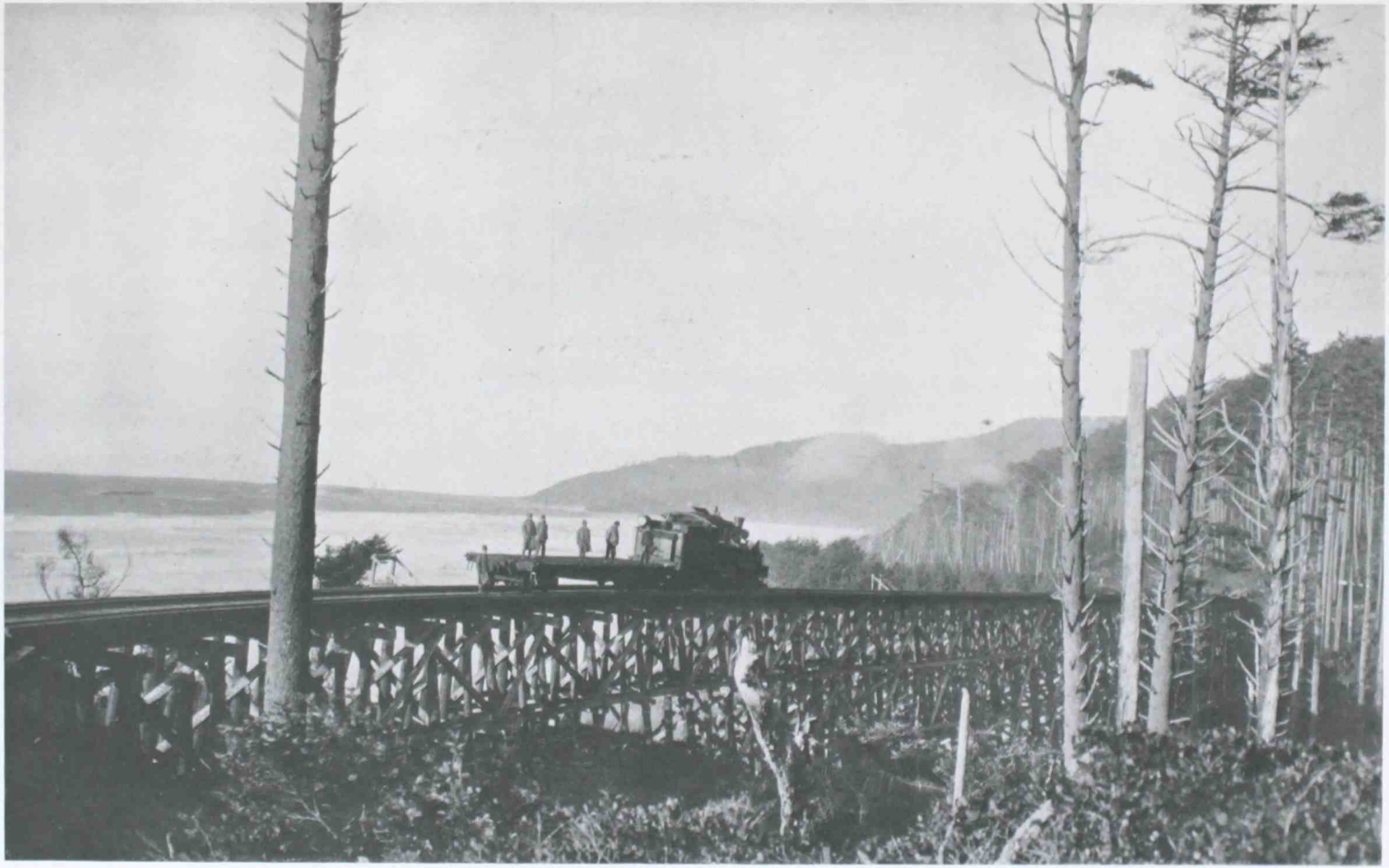
Controls timbered area containing following quantities:

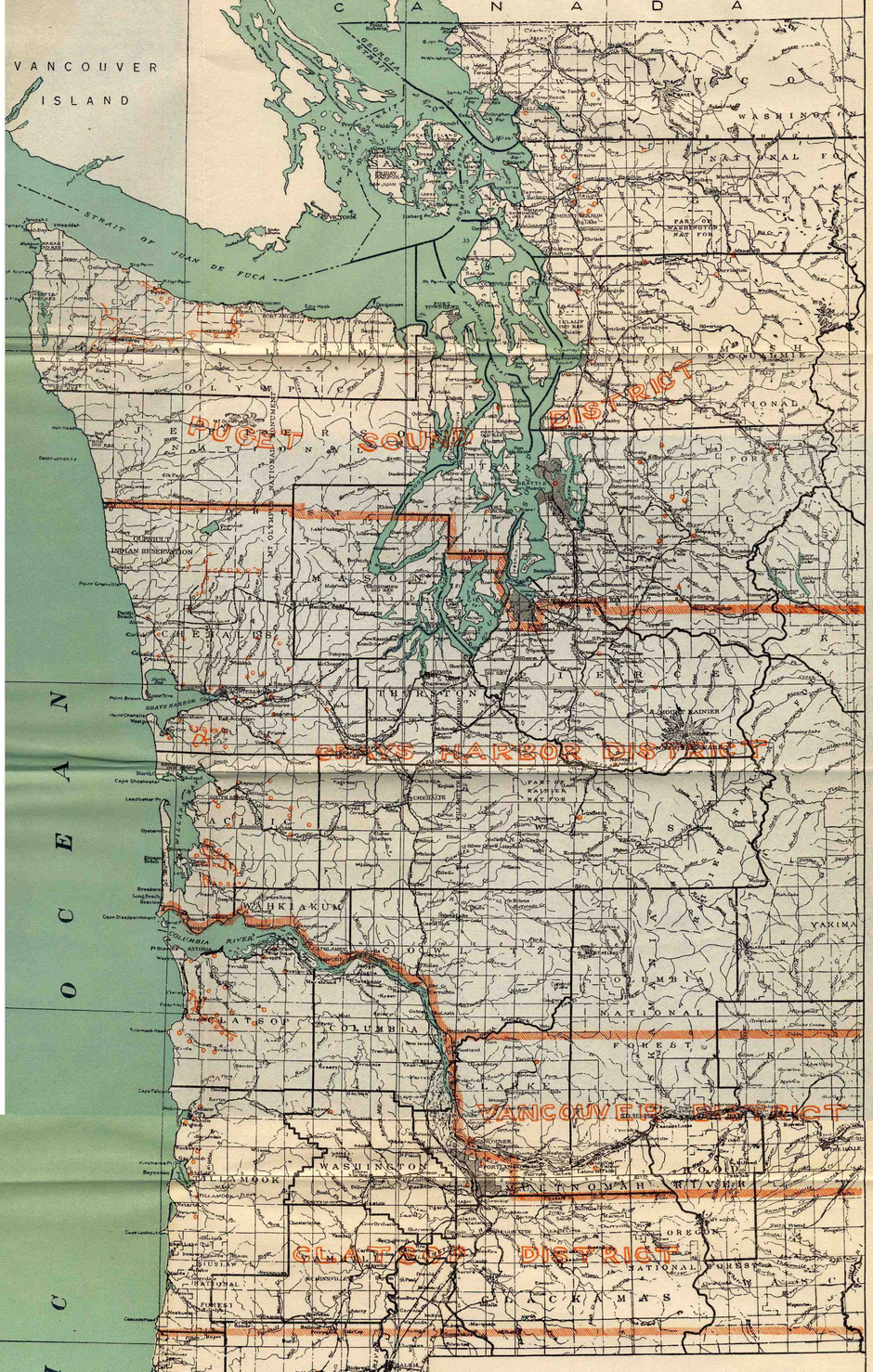
Spruce	171,860,000
Fir	37,920,000
Cedar	48,055,000
Hemlock	27,395,000

Above quantities from shaded area.



THE PACIFIC AND THE NORTHWEST
Division Railroad, Near the Beach,
Through the Oregon
Timbered Hills





DISPOSITION AND LOCATION OF TROOPS BY DISTRICTS
IN OREGON AND WASHINGTON

SPRUCE PRODUCTION DIVISION
U. S. ARMY

	PUGET SOUND			GRAYS HARBOR			CLATSOP			YAQUINA BAY			COOS BAY		
	Sqd Nº	Officers	Men	Sqd Nº	Officers	Men	Sqd Nº	Officers	Men	Sqd Nº	Officers	Men	Sqd Nº	Officers	Men
1	32	6	44	42	9	216	66	7	170	79	4	151	102	10	245
2	33	11	206	43	4	75	67	6	268	80	5	284	103	6	122
3	34	5	161	44	7	194	68	5	108	81	5	127	139	8	121
4	35	5	125	45	11	217	69	4	164	82	3	95	142	7	351
5	36	3	58	46	4	51	70	5	78	83	4	310			
6	37	7	190	47	12	337	71	4	150	84	3	129			
7	38	5	110	48	7	170	72	3	77	86	4	175			
8	39	8	166	49	6	160	73	1	26	88	2	143			
9	40	5	226	50	6	238	74	5	195	89	3	147			
10	41	6	128	51	5	114	75	4	171	90	5	159			
11	85	3	179	52	8	285	76	4	136	91	3	146			
12	87	4	148	53	8	216	77	5	346	92	4	148			
13	98	3	141	54	4	255	78	3	94	93	5	166			
14	100	4	101	55	7	238	114	4	143	94	3	139			
15	104	2	60	56	6	291	129	2	38	95	3	142			
16	115	3	194	57	5	190	133	1	26	97	3	135			
17	117	3	141	58	8	253	134	3	53	98	3	140			
18	118	3	147	59	8	183	135	4	65	101	3	207			
19	119	5	222	60	3	188	145	3	143	109	4	127			
20	120	3	98	61	5	150	146	3	113	110	1	74			
21	121	3	50	62	10	160	147	2	153	111	2	153			
22	122	5	144	63	5	285	148	3	76						
23	123	2	141	64	8	229	149	6	229						
24	124	2	133	65	4	176	150	3	95						
25	125	5	157	107	5	203									
26	126	3	132	108	3	134									
27	127	3	135	176	6	198									
28	128	3	150												
29	130	2	64												
30	136	5	181												
31	138	2	88												
32	140	3	132												
33	41	5	81												
34	43	2	148												
35	144	3	135												
TOTALS	140	4736		173	5251		90	3252		72	3298		31	839	

SUMMARY

DISTRICT	OFFICERS	MEN
PUGET SOUND	140	4736
GRAYS HARBOR	173	5251
CLATSOP	90	3252
YAQUINA BAY	72	3298
COOS BAY	31	839
DETACHED SQDRNS	3	239
UNASSIGNED	225	590
TOTAL IN FIELD	734	18205
PORTLAND HDQS	132	404
VANCOUVER BKS	356	9052
TOTAL IN DIVISION	1222	27661

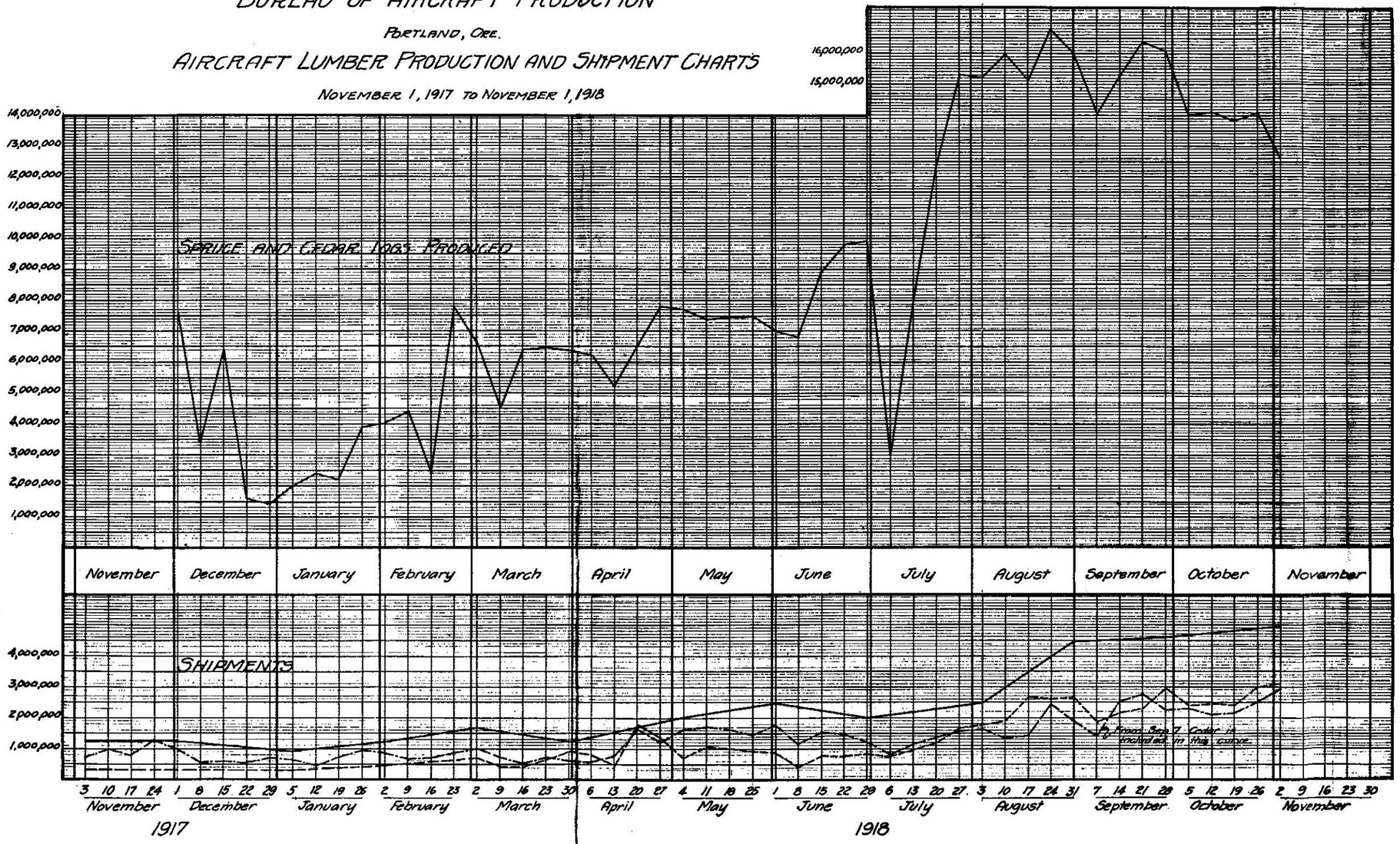
UNASSIGNED INCLUDES OFFICERS AND MEN ATTACHED TO DISTRICT HEADQUARTERS AND ON DETACHED SERVICE FROM VANCOUVER BARRACKS.

○ INDICATES SQUADRONS

— INDICATES S. P. D. RAILROADS

Spruce Production Division
Bureau of Aircraft Production
Portland, Ore.

Aircraft Lumber Production and Shipment Charts
November 1, 1917 to November 1, 1918



Shipments of Airplane Stock by Months in Board Feet
November 1, 1917 to October 31, 1918

Month	Spruce	Fir	Total
November 1917	3,946,828	1,499,937	5,446,765
December "	2,688,671	1,318,790	4,007,461
January 1918	3,344,887	1,915,992	5,260,879
February "	3,305,456	2,594,967	5,900,423
March "	2,784,166	2,364,557	5,148,723
April "	5,074,102	4,467,813	9,541,915
May "	6,931,597	4,659,689	11,591,286
June "	5,545,494	2,863,824	8,409,318
July "	7,602,650	4,906,664	12,509,314
August "	8,751,057	9,457,971	18,209,028
September "	8,585,141	8,099,817	16,684,958
October "	11,100,042	11,613,866	22,713,908
Total	69,660,091	55,763,887	125,423,978
Prior and subsequent to above	9,894,324	3,763,290	13,657,614
Grand Total	79,554,415	59,527,177	139,081,592

Legend for Shipment Curves
———— Total Fir and Spruce Shipments per week averaged over monthly interval
—·—·— Spruce Shipments per week
– – – – – Fir Shipments per week